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VETERINARY MEDICINE

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75 E. Wacker Drive,
Chicago, U. S. A.

Junior FORT DODGE BIO-CHEMIC REVIEW

APRIL 1934

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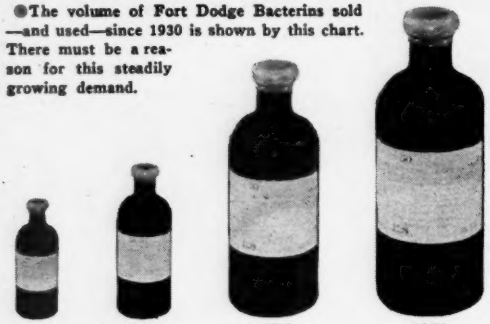

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Arthritis in ducks, chickens, pheasants and turkeys due to staphylococcic infection is more or less prevalent in some sections. Whether or not there are some predisposing factors or influences to this arthritic condition has not been determined. As a rule, the staphylococcus aureus is the offending microbe; the organisms appear to be the ordinary *Staph. pyogenes aureus.*

Cases of meningitis or meningo-encephalitis in feeder cattle have been observed by practitioners in sections where the 1933 corn crop was damaged by drouth. The affected animals manifested the usual symptoms of meningitis; autopsy findings consisted of meningitis and in some cases mild enteritis. In every instance the corn that was fed was worm eaten and mouldy. When a good grade of corn was provided, no new cases developed.

A substance identical with the female sex hormone, theelin, has been obtained from palm nuts. Sex hormones occur in all animals, in the highest and lowest, and similarly acting substances are found also in plants. The plant sex hormone when given to animals stimulates the sexual activities and conversely, the animal hormone effects the sexual development of plants. It is regarded as probable that the sex hormone of all plants is the same.

Abel and associates, Johns Hopkins Medical School, as a result of studies during the past year, have reached the conclusion that tetanus toxin reaches the central nervous system through the blood and not by traveling along nerve trunks, as was formerly thought. Only the toxin produced by the botulinus organism is more potent than tetanus toxin.

According to Eddy and Kellogg of Teachers College, Columbia University, pellagra is not caused so much by too little vitamin B_2 (G or P-P of Goldberger) as by a combination of too little vitamin B_2 and too much vitamin B_1. To put it another way: B_1 causes pellagra, but is inhibited from so doing by an adequate amount of B_2. It is presumed that the same circumstances apply to the occurrence of blacktongue in dogs.

The trade names of 89 so-called orthopedic shoes feature "doctor" as a part of the name. Since the great majority of these lasts were neither designed nor inspected by physicians, and in the few cases where the "doctor" is really a medical man, he has had no part in the construction of the shoes, the trade names are essentially misleading and competitively unfair. If the "Tugwell" bill passes, making such shoes technically "drugs" it is believed such misleading advertising will be in controvention of the statute.

Investigations of amebic dystenery in man show that from 5 to 10% of all persons harbor the *Endamoeba histolytica,* the causative protozoan.

Seven cases of *S. suipestifer* infection in the human has been reported by Kuttner and Zepp in the Bulletin, Johns Hopkins Hospital. This report should be of interest to veterinarians, as it indicates the possibility of infection of veterinarians that contact typhoid in pigs.

A highly fatal disease of canaries believed to be due to a filterable virus has been reported by Kikuth and Gollub. Pigeons and chickens are immune but sparrows and finches apparently are susceptible. No method has been developed for immunizing canaries or other susceptible birds.—*Bio. Abs.,* 7-9-21577.

Mad itch, a disease occasionally observed in cattle, is caused by a filterable virus. The disease may be transmitted by inoculation to rabbits, guinea pigs, white rats, white mice, cow, cat, duck, chicken and hog. This malady is very similar if not identical to pseudo-rabies of Europe.—*Bio. Abs.,* 7-9-21523.

Feline distemper according to Hindle and Findlay, is caused by a filterable virus. This virus may be instilled intranasally or inoculated subcutaneously, intraperitoneally, or intracerebrally. Dogs, ferrets, mongoose, rabbits, guinea pigs and mice proved insusceptible to the feline virus. Immune serume gives some protection.—*Bio. Abs.,* 7-9-21554.

Hematuria vesicalis is the name applied by Bull and Dickinson to a condition in cattle in Australia that is manifested by hemorrhages into the bladder and bloody urine. The cause is unknown. The soil, pasture and feed are apparently the same as in adjacent areas where the disease does not occur. This malady is apparently very similar to red water disease in the Pacific northwest in the United States and Canada.—*Bio. Abst.,* No. 18732, Vol. 7.

Investigations show that there are about 3,000 cases of undulant fever in France each year.—*S. N. L.,* 25:669.

At least one-fourth of our milking cows are "boarders." Annually they produce upwards of a billion pounds of butter fat that never returns a penny of profit to the dairy farmers.—*Hoards Dairyman.*

There are three chief groups of parasites of horses: (1) Anthropods, those with jointed appendages and a chitenous exoskeleton, including mites, ticks and flies; (2) protozoan parasites, and (3) helminth parasites which include the round worms, of which over forty different species in one subdivision affect the horse.

Veterinarians in Public Health Work

According to a list published by the United States Public Health Service, veterinarians holding executive positions on municipal health boards in cities having a population of 10,000 or more include: San Francisco, Calif., G. A. Melody, Chief Dairy Inspector. Boulder, Colo., H. L. Morency, Director of Public Health and Sanitation. Washington, D. C., Reid R. Ashworth, Director of Food Inspection and Jesse P. Porch, Director of Serological Laboratory. Chicago, Ill., Henry C. Becker, Chief Bureau of Dairy Products. Boston, Mass., Francis X. Mahoney, Health Commissioner and P. H. Mullowney, Deputy Commissioner of Food., St. Louis, Mo., Joseph C. Willett, Chief of Laboratories; John S. Koen, Chief of Food Control; Ernest C. McCulloch, Milk Controller; Milton R. Fisher, Chief Veterinary Milk Inspector; W. C. Dillard, Veterinary Meat Inspector; H. V. Persells, Assistant Veterinary Milk Inspector; Henry A. Faust, Veterinarian; and C. B. Michel, Veterinary Meat Inspector. Perth Amboy, N. J., Chas. S. Thompson, Health Officer. Ridgefield Park, N. J., William F. Reynolds, Health Officer. Cleveland, Ohio, R. F. Leslie, Director, Food and Drug Administration.

Beaumont published his famous observations, on digestion and movements of the stomach, in 1833. He was the first investigator to study these subjects and most of the present knowledge of digestion dates from that time.

Kinsley and Roberts found that following the debacle of 1929, when because of the poverty of the owners, the ration of the horses and mules on the islands of St. Croix and Puerto Rico, was reduced to cane tops alone, intestinal helminthiasis assumed epizootic proportions and in four years increased in prevalence till more than 20% of the animals were attacked acutely with a high mortality. There had been no change in environment and American race horses on the islands, fed a good ration, were unaffected.

The fact should not be overlooked that normal as well as pathological parasitisms occur. The clinician need concern himself only as to the latter. Our domestic animals have developed through the ages along with their parasites. Parasitism is a "natural" condition of both man and lower animals. Many factors may disturb the normal biological balance between host and parasite and lead to excessive parasitism. Among such factors may be enumerated an increase in numbers of the host on a given area leading to intense infestation; climatic changes favorable to the parasite in the egg, embryo or larval stages; soil conditions favoring the parasite, and lowered resistance of the host due to disease, dietetic deficiencies, exposure, overwork, overcrowding or other causes. Of all causes tending to translate normal parasitism into pathological parasitism, the lack of adequate nutrition is probably the most common and the most important. So common is it that "unthriftiness" has heretofore been looked upon as the most constant symptom of harmful parasitic infestation. Probably in the majority of cases, unthriftiness is the cause not the result of the increased number of parasites of which the host is victim.

As recently as 20 years ago, tuberculosis in cattle was generally thought to be an uncontrollable disease.—*S. N. L.*, 25:669.

Foster and Cort have shown that dogs that have become resistant to hookworm after repeated infection develop the disease when placed on inadequate diet and that a return to an adequate diet leads to recovery even though the feeding of embryos of the *Ancylostoma caninum* be continued.

There is a wide-spread tradition among farmers that corn fodder fed to horses causes worms. There is ample clinical evidence to support the belief that horses receiving only corn fodder for the forage ration, harbor greater numbers of strongyles than animals fed a more adequate ration.

Milk Inspection and Milk Quality

A list of the cities for which milk sanitation ratings that have been reported to the United States Public Health Service by the State Milk Sanitation Authorities show a milk sanitary rating of 90% or more for both raw and pasteurized milk comprises 27 cities in Alabama, one in Arkansas, one in Indiana, three in Kentucky, 18 in Mississippi, four in New Mexico, 24 in North Carolina, one in Oregon, one in South Carolina, three in Tennessee, 12 in Texas and two cities in the state of Washington.

Nearly all are small places almost of village size. Only Louisville, Kentucky and Dallas, Texas being of a size popularly termed cities. Of course, the milk in the cities on the official honor list represents but a very small fraction of the milk of equal quality available in cities not on the list. The trick in the listing is: The ratings are based upon the Public Health Service Milk Ordinance and Code which is not considered desirable or adequate by most municipal health authorities, but in some sections is the best the public will provide funds to support.

Experimenting with Veterinary Police Measures

THE bulk of veterinary literature on the prevention and control of animal plagues deals not with hog-cholera, tuberculosis, or Bang's disease, but with rinderpest. A familiarity with that literature will contribute materially to the success of those in official live stock sanitary work, and at the same time save tax-payers a great deal of money. The cost of ignoring lessons of the past could be cited for every animal disease control project we have undertaken. In view of the many futile and expensive regulations that have been promulgated ostensibly to control or eradicate Bang's disease, but in reality by their variability serving mainly to hamper commerce in dairy cattle; the worth of information gained from the experience of others, and particularly the cost of ignoring a record of accomplishment extending over more than 150 years is painfully evident.

In deploring certain national and state efforts to effect economies in the cost of government, many are fond of saying that expenditure in the pursuit of new knowledge is an "investment capable of paying higher dividends in the form of practical results than any other governmental activity" and that none but a fool would hinder it. This being true what shall we say of those who fail, in this time of stress, to make use of facts developed by research and lessons taught by experience. There is no surer way to engender public indifference to the pursuit of new knowledge than to fail to utilize the knowledge which we already have.

Successful control of communicable and nutritional diseases of animals requires the services of three classes of workers: research workers to develop the facts upon which methods for control must be predicated; veterinary practitioners to put them into effect, and regulatory officials to supervise and coordinate the work of the practitioners. The third class are not keeping pace with the other two classes. The differing regulations for the control of Bang's disease have already been cited. Others could be given. It is axiomatic that little or nothing can be done to eradicate a disease or prevent its spread until its location is known. Measures to limit the extension of a disease must be based upon a knowledge of its natural means of extension; its seasonal incidence, the influence of natural features of terrain; the effect of commercial traffic, its periodicity, etc. Efforts at animal disease control without such information are little better than "shots in the dark"—just a little more scientific than witches' incantations.

Anyone may learn at any time from authoritative sources the exact number of cases of influenza in let us say Tulsa, Oklahoma last week or any week or the number of cases of typhoid fever in Los Angeles or of pneumonia in Des Moines or of anterior poliomyelitis in New York City or rabies (in man) in New Orleans or tuberculosis in Minneapolis and so on through the list of important diseases.

But how much information is there available as the incidence and mortality of diseases of animals? Once a year accurate information as to glanders, a very unimportant disease in this country; fairly complete reports on tuberculosis at more frequent intervals; estimates about twice yearly on hog-cholera and there for all practical purposes the record ends. Waves of epizootics sweep across counties, unheralded and at least in part for this reason unchecked. Information as to the progress of these waves would help immensely, veterinary practitioners, in their path, to discharge their function of local disease control, but nobody bothers

either to publish the facts or to notify the men specifically concerned. Shipments of animals, potential spreaders of disease and parasites go from distant states into every county. The regulatory officials of both the states of origin and destination know of the shipment, but is the practitioner the local representative of all live stock disease control forces notified? Frequently he is but by the purchaser of the animals when disease has already appeared and the opportunity for disease prevention, the most profitable veterinary service, on that farm at least has passed. For obvious reasons the handling of tuberculosis is an exception to the rule that obtains as to most other animal diseases.

All the facilities exist for the collection of statistics as to animal disease and for the dissemination of this information, that exist for the collection of analogous information concerning the disease of man; not as to cities perhaps, but certainly as to states and with few exceptions as to counties. All that the live stock sanitary official can do to control diseases of live stock is to help the veterinary practitioners. That is the beginning and likewise the end of his function. He is not doing it by making one sort of regulation for the shipment of cattle into Missouri, another for Alabama, a third for New York, a fourth for Idaho and so on as is now the status in the matter of Bang's disease in particular. He is not promoting the success of his own department in promulgating elaborate regulations for shipment of live stock, enforcing them only as to rail shipments and openly ignoring a greater traffic by truck—and examples of just this can be cited. He is giving practitioners less than the best assistance when he fails to make available to them the incidence of disease in contiguous and in more remote areas. And the research worker, lacking information as to the prevalence and distribution of animal diseases, their periodicity and rate of extension, is handicapped in the selection of subjects for investigation and in the interpretation of his findings.

Inter-Relation of Calcium and Phosphorus in the Diet

It has been known for some time that cattle and other animals suffer from a calcium deficiency where the amount of this mineral in the diet is insufficient for maintenance in the case of adult animals, or for growth in the young. It is also equally well established that cattle suffer from phosphorus deficiency in various districts where the forage is so low in phosphorus as to supply an insufficient amount of this mineral for the requirements of the animals consuming it.

Major Kintner and associates have shown recently that horses and mules suffer from calcium deficiency even when there is an ample quantity of this mineral in the diet if the diet contains also an excess of phosphorus; but that this decalcifying effect of phosphorus can be overcome by increasing the calcium in the diet to a point where the ratio of CaO to P_2O_5 is 1:2 or one to less than two. So long as the minimum requirements of the animal for these two minerals are met it apparently matters little how much or how little of them the ration contains provided only that there be at least one-half as much calcium oxide as phosphorus pentoxide in the diet, including the water consumed.

Recently, Du Toit, Molan and Groenwald,[1] in South Africa, undertook an experiment to determine if an excess of calcium in the diet of calves has a reciprocal effect on the phosphorus content of the diet. Assuming the normal ratio of calcium to phosphorus in the diet of growing calves to be approximately that of milk, or 1 to 1.4, a ration was provided containing an adequate amount of phosphorus, but with the calcium increased to more than three and one-half times the normal amount, or with a CaO to P_2O_5 ratio of 1:0.3. The growth of the calves was unaffected by the increased calcium in the experimental ration nor were any deleterious effects of the diet revealed during a year that the calves were fed this diet excessively high in calcium oxide. The added calcium in the experimental ration was in the form of calcium carbonate.

The practical application of this finding is that bone meal may be used as a mineral supplement in phosphorus deficiency, since the additional calcium obtained in this way would not be detrimental. On the other hand, in calcium deficiency due to excess of phosphorus, in the diet, bone meal is not an appropriate source of calcium since it contains also a high percentage of phosphorus and would continue the low-calcium-high-phosphorus ratio.

[1] *The Onderstrepoort Journal of Veterinary Science and Animal Husbandry*, Vol. I, No. 2, Oct., 1933.

Some Clinical Aspects of Endocrinology and Endocrine Therapy

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THE system of modern endocrine therapy had its crude beginning many centuries ago. The literature refers to the belief of primitive man that he could increase his own stamina and combative prowess by consuming various organs of his enemies or of beasts. The warrior would eat the heart of his enemy to increase his own courage. Such is reported to have been practiced among our American Indians. Diseases of organs also were believed to be cured by supplying the substance of similar healthy organs. It was a doctrine of heart cures heart; lungs, lungs, and liver, liver. As a system of treatment this finally came to be known as opotherapy, later as organotherapy, and more recently as endocrine therapy.

To obtain a reasonably clear conception of the fundamentals and rationality of endocrine therapy, one must consider a few general aspects of endocrinology.

The physiological or functional activities and relationships of the organism are regulated either by nervous or chemical mechanisms. The chemical regulators or "hormones" include a special group of chemical substances that play an important rôle in the control of numerous bodily functions, many of which are vital functions. Hormones may be produced in part by nonglandular tissues, for example, carbon dioxide and lactic acid; the majority, however, are produced in special tissues designated as the organs or glands of internal secretion. Most glands have ducts through which their secretions are discharged; however, some, often referred to as "ductless glands," discharge their products directly into the blood or lymph. The term "ductless" has now been discarded in favor of "endocrine" because several glands with a definite duct through which certain of their products are discharged, also produce an internal secretion which leaves the gland cells by way of the blood or lymph. An outstanding example is the pancreas which, in addition to its well-known digestive secretion, also produces the hormone, *insulin*. The term "hormone" was originated by E. H. Starling, a noted English physiologist, upon the discovery by him and his co-workers of the *secretin* of the wall of the small intestine and its chemical relation to the production of pancreatic juice. It seemed necessary to Starling to select a name for these chemical agents produced in one organ of the body and which, following distribution by the blood or lymph, may modify the functions or structures of other organs or indeed co-ordinate the functional activities of several remote organs. In presenting the close analogy of hormones to the ordinary drugs of our pharmacopoeias, one can well quote Starling's own words:

> Since, in the normal functioning of the body they (the hormones) have to be discharged at frequent intervals into the blood stream, and carried onward by this to the organ on which they exercise their specific effect, they cannot belong to that class of complex bodies which include the toxins of animal or vegetable origin. We must therefore conceive them to be substances of definite chemical composition, and comparable in their chemical nature and mode of action to drugs of specific action, such as the alkaloids. This conclusion is borne out by the few investigations which have been made as to the nature of the chemical messengers in the case of certain well-marked correlations of function in the higher animals. In consequence of the distinctive features of this class of bodies, and the important functions played by

them in the higher organisms, I have proposed to give a special name to the class—viz,. hormones, the Greek "harmao," which means, "I arouse or excite."

The term hormone is, in a way, somewhat of a misnomer, in that the internal secretions may either increase or decrease bodily activities. Suggestion has been made to apply the term "hormone" to those chemical substances whose influence is excitatory and the term "chalone" to those whose influence is inhibitory. This distinction has not been generally adopted and the term hormone as originated by Starling is ordinarily applied to the individual chemical substance of the endocrine organ whether its influence be excitatory or inhibitory.

The term "humoral" is also now in general usage as referring to endocrine influences. The hormones then, represent definite chemical substances that initiate certain physiological responses.

These active substances may be produced as tissue products with a special predestined influence or again they may be by-products or even waste-products of general cell metabolism. There is no doubt but that certain products of endocrine gland origin have a very definite relation to the co-ordinating of complex activities of the component parts of the body into functional harmony. It is generally accepted that practically all regulation of general metabolism, body growth, sexual functions and reproduction phenomena as a whole are of hormone regulation or co-ordination. The regulation may be effected by direct influence through the blood or in certain instances indirectly through the autonomic nervous system, as in the case of *epinephrine* of the adrenals.

Of the various function-controlling mechanisms of the body the best known, to the laity at least, is the nervous system. Nerve and hormone control, however, should not necessarily be considered as separate and independent processes. No little part of the effectiveness of the two methods is due to the fact that hormones frequently exert their influence through the medium of the nerve supply, and the nervous system often influences the hormone production of the endocrine glands. There is a reciprocal relationship; hence the above reference to epinephrine which exerts its systemic effect largely, if not entirely through the (peripheral) sympathetic nervous system. Apparently any tissue not receiving sympathetic innervation does not respond to that hormone. On the other hand, the discharge of *epinephrine* from the adrenals, so far as is known, occurs only when impulses are received by the gland through its sympathetic nerve fibers. *Insulin,* the pancreatic hormone, probably acts both through the nervous system and directly upon the tissues dealing with carbohydrate. *Secretin,* the duodenal hormone, on the other hand, causes an outpouring of pancreatic juice just as well from a denervated as from a normal pancreas. The corpus luteum seems to be entirely independent of nervous influences although it is quite responsive to a hormone from the *anterior pituitary.* The thyroid can be transplanted surgically in the body, and though the graft receives no nerve impulses, will continue to supply *thyroxine* in an amount sufficient to maintain normal health. There is evidence that the thyroid under normal circumstances responds to nervous influences.

The Endocrine Organs

The definitely known and generally accepted endocrine organs are the thyroid, parathyroids, pituitary, adrenals, pancreas, male and female gonads, stomach, and intestines. Other organs accredited by certain workers with having endocrine functions are the thymus, pineal, prostate, mammae, placenta, heart, liver, and spleen. In addition, chemical substances of a hormone character are produced in the various tissues in cell metabolism and, although properly regarded in certain instances as waste-products, may have important functional relationships such as that of the carbon dioxide in the blood to respiration.

Endocrine Duality and Interrelationships

A peculiar feature of certain endocrine organs is their structural character, indicative of diverse functions. The pituitary

consists of an anterior and posterior lobe, and the products of these lobes produce quite different physiological effects. The adrenals consist of two parts, the cortex and the medulla, and the products of these parts have entirely different properties. The characteristic hormone of the corpus luteum, *progestin*, is entirely different from the ovarian hormone, *theelin;* these originate from distinctively different tissues in the ovary. The thyroid and parathyroid glands with very different physiological activities are in many animals quite closely associated anatomically. Are these close anatomical relationships of physiological significance? Further research may solve this complicated problem.

Complex schematic diagrams have been developed by various writers to set forth the interdependence among the endocrine organs. It hardly seems that such definite charts are justified by our present knowledge. Experimental work does, however, indicate certain definite inter-relationships in body functions such as the thyroid, adrenals, and pancreas in oxidative metabolism, and the anterior pituitary and gonads in reproduction. Such hormone inter-relationship may be evidenced either in the way of synergism or of antagonism. Demonstrated endocrine inter-relationships such as those mentioned have been the basis for so-called pluriglandular therapy which, while undoubtedly sound in principle, has been grossly abused due to the lack of definite physiological information and methods of endocrine diagnosis. It is possible and indeed probable that in the future, pluriglandular therapy may be the most rational and efficacious method of treating endocrine deficiencies. It has been observed that hormones influence vital processes involving both physical and mental well being; hence disturbances of hormone production and balance must result in many bodily derangements. Some of these are now recognized as definite endocrine diseases and theory indicates the existence of many more not recognized. It seems quite probable that discoveries of the future involving gland disorders will point to combinations of disorders, syndromes so to speak, rather than defects of single glands. So much for some of the fundamental aspects of endocrinology.

Endocrine Therapy

Endocrine gland preparations of wide variety are now offered to the medical professions. Their use is quite general and in many instances on an empirical basis. As long as the diagnosis of endocrine deficiencies is as generally uncertain as at present, the therapeutic application of endocrine products must necessarily remain rather empirical. However, the advance of medical science has been slow but sure. Considering the recent advances in the fundamental knowledge of endocrine functions and relationships, and chemical triumphs in the determination and isolation of certain hormone principles, one may conclude that the future of endocrine therapy offers much promise of benefit to man and the lower animals alike. Meanwhile, in many instances the patient will continue to be somewhat of an experimental subject in the hands of the clinician. In the past, brilliant therapeutic successes have, of course, been accomplished in this way. It is necessary that premature enthusiasms be avoided and that the clinician keep informed on current advances in endocrinology. While it would appear that endocrine preparations may be wonderful therapeutic tools in the hands of the informed clinician, the tremendous potency of minute amounts of certain products offers a considerable possibility of untoward results in the hands of an untrained or inexperienced person. At present there are four general types of endocrine therapy, an understanding of which is essential to successful application. They may be briefly identified as follows:

1. Substitutive or Replacement Therapy. Gland products supply the physiological secretions lacking as a result of congenital absence, incomplete development, atrophy, or functional inactivity. Insulin and thyroxine usages typify this kind of therapy.

2. Homostimulative Therapy. This type of therapy is based upon the premise that

the hormones of gland products, when administered over a period of time, may have a definite stimulative or restorative influence on the corresponding glands. Temporary relief of the functional production of the gland may influence its restoration. This therapy is illustrated by the use of thyroid products in functional hypothyroidism and ovary products in certain ovarian dysfunctions. Opinions of observers on the efficacy of this kind of therapy vary from "there is some definite evidence in its support" to "no gland can be stimulated to activity by its own product."

3. Symptomatic or Specific Therapy. This involves the use of gland products for specific pharmacological effects in conditions not related to that particular gland deficiency. Examples are the use of epinephrine in acute asthmatic attacks and of posterior pituitary extracts in muscular atony of the uterus or bladder.

4. Empirical Therapy. The use of gland products such as those of the pineal, thymus, placenta, and mammae where the scientific background for the use is rather uncertain. Much pluriglandular therapy is quite empirical.

Before undertaking to present the various forms of gland preparations now offered to the medical professions, one should survey in a more general way the present status of rational endocrine therapy. The systemic effects of deficient or perverted internal excretion of the pancreas and thyroids are striking. Hence, notable success has been attained with products of these glands such as *insulin* and *thyroxine*. *Epinephrine* of the adrenal medulla is available in refined and potent form and is highly valuable in various forms of allergy, such as spasmodic asthma, urticaria, etc.; epinephrine is also used locally to control hemorrhage and prolong anesthesia in operative fields.

Recently a potent extract of the adrenal cortex, *cortin*, has been prepared which seems to be specific in the rare disease of man known as Addison's disease. Evidence indicates that it may have other important uses, and simple extracts of the cortical tissue seem to be effective by mouth which is unusual for most endocrine products.

A potent extract of the *posterior pituitary* is available and valuable as a smooth muscle stimulant, especially in uterine inertia, or in bladder or intestinal stasis. It also has a specific oliguretic effect in the disease, diabetes insipidus. The growth hormone of the *anterior pituitary* has now come into prominence as have the sex-related hormones of this same lobe; however, their value as therapeutic tools is yet largely to be worked out. For the benefit of the bald-headed fraternity, perhaps the reported possibilities of anterior pituitary extract in the restoration of hair growth should be mentioned. For the treatment of reproductive abnormalities, in addition to anterior pituitary products, *progestin* of the corpus luteum and *emmenin* of the placenta offer promise but as yet have not been definitely proved.

In comment upon reproductive phenomena it may be said that reproductive functions are perhaps more strikingly under endocrine control than any other physiological activities. In the male apparently the thyroid, anterior pituitary, and adrenal cortex seem to be particularly related. In the female in the cyclic sexual processes, the hormone, *theelin* of the graafian follicle, progestin of the corpus luteum, and the anterior pituitary hormones are involved. If fertilization takes place, the placenta also begins to contribute regulatory hormones, particularly emmenin, and finally a special hormone of the anterior pituitary, *prolactin*, seems to be definitely related to lactation at parturition.

Recently other hormones besides progestin have been described as produced by the corpus luteum. One which has been given the name *relaxin* is said to promote absorption at the symphysis pubis and relaxation of the pelvic ligaments as a preparation for parturition. An inhibitory hormone which delays or prevents ripening of the follicles and thus suspends ovulation in the case of pregnancy has also been described. Here is a highly complex pluriglandular relationship or balance, maladjustment of which may have a definite sig-

nificance in infertility in either male or female.

The use of gland products in the treatment of reproductive abnormalities appears to have some success; however, further research is needed to define their actual possibilities and limitations. Here seems to be a very definite field for pluriglandular therapy. For the parathyroid hormone, ordinarily called *parathormone,* there would appear to be future clinical possibilities. Its fundamental relationship to calcium metabolism is definitely established, and in turn the relation of deranged calcium metabolism to certain types of tetany has been demonstrated and treated successfully by the use of parathyroid products.

It is also now recognized that substances of hormone character may be formed in other than strictly glandular tissues. There is increasing evidence that the sympathetic and parasympathetic nerve fibers exert their effects on peripheral tissues by the formation of specific hormones. It has been shown that the stimulation of the sympathetic nerves to plain muscle tissues liberates a hormone to which the name *sympathin* has been given by the investigators. Sympathin appears to be similar in its action to epinephrine. After formation, it is absorbed into the blood and may influence the activity of distant organs, such as the heart, blood vessels, and the salivary glands. The humoral influence of tissue metabolites such as carbon dioxide and lactic acid has already been mentioned.

One of the interesting fields of endocrinology is the possible relationship of hormones to senescence. Certain senile alterations directly suggest the operation of endocrine factors. Possibly future developments in the study of senility may evolve endocrine methods which will prolong life beyond what hygenic and nutritional methods have already accomplished — who knows? The newer knowledge in physiology of the endocrine relationships to body functions forms a new departure which will undoubtedly have an increasingly important bearing upon corrective therapeutic methods. Physiological changes now explained in terms of chemical (humoral) regulation have altered the outlook on many physiological problems which have a direct bearing on problems of clinical medicine.

Endocrine Preparations

The complications to be met in attempting to produce potent endocrine products for clinical use is recognized by manufacturers who have attempted to meet the manifest needs. Except in those few cases where the chemistry of the hormone is at least partially understood, the manufacturers are working with material the nature of which is obscure. It is possible that an organ known to elaborate a hormone may not store the hormone in its substance but discharges it as rapidly as formed. Even if a significant quantity of hormone is present in a living tissue, it may be so unstable as to become inactive in dead tissue, or be destroyed during the processing of the organ in the laboratory.

The instability of some of the isolated hormones, as well as the occult ones in the cruder gland products, is recognized by the fact that several of the preparations in clinical use are not effective when administered by mouth, seemingly being destroyed by the digestive processes. Much research must still be done in fundamental endocrinology and in endocrine diagnosis, as well as in the development of endocrine preparations, before endocrine therapy and especially pluriglandular therapy will assume the rational practical proportions which the clinician desires. It is evident that successful endocrine therapy must be based primarily on endocrine diagnosis which has its difficulties. Then follows the selection of the endocrine preparation and unfortunately the armamentarium of proved endocrine preparations is rather limited. One author aptly states, "Until recently the endocrine tools of the clinician have been few and mostly dull."

However, the future for a more rational endocrine therapy appears promising. Of the many organ products presented to the medical professions, four may be said to have given decisive clinical results, namely, those of the thyroid, adrenals, the posterior

pituitary, and the pancreas. The active principles of the first two mentioned have been isolated in pure form and of the latter two in forms of standardized potency. Most of the other organ principles, several of which offer much promise, are still in experimental preparation and with the exception of the estrus-producing principle of the ovary, *theelin*, have not been isolated in sufficiently pure form to determine their chemical nature.

Organ preparations for therapeutic use consist of active principles in dilution, the dried tissues in powder or tablet form, and various forms of extracts of the tissues. Since in many instances there are no tests for quality of the products, the clinician must rely on the general reputation of the manufacturer. The products are prepared for various methods of administration and in some cases, when not effective by the mouth, and not adapted for hypodermic or similar use, it appears to be practicable to apply them to other absorptive surfaces such as the nose, vagina, etc.

A brief discussion of a number of gland products of recognized and accepted clinical efficacy follows, included in which is a summary of the type of preparations and the recommended therapeutic uses.

EPINEPHRINE.—(Adrenine, Adrenalin, Suprarenalin, Suprarenin.) This represents the active crystalline principle of the adrenal medulla. It has been prepared in pure form; its chemical structure ($C_9H_{13}NO_3$) is known, and it has been prepared synthetically. Epinephrine is extensively used in surgery and to a less extent in medicine as a solution of 1-1000 of epinephrine hydrochloride. Such a dilution is official as Liquor Epinephrinae Hydrochloridi U. S. P. It shows little systemic effect given by mouth and should be administered intravenously or intramuscularly. Epinephrine is chiefly used locally in dilutions (physiological salt solution, oils, ointments) of from 1-1000 to 1-25,000 for its vasoconstrictor influence in hemorrhage and congestive conditions. The utilization of epinephrine to prolong the effect of local anesthetics by slowing up absorption from the injected area is a common practice.

Epinephrine administered intravenously or intramuscularly in conservative dosage appears to be the most effective treatment in acute anaphylactic reactions from foreign sera, serum sickness, and spontaneous hypersensitivities (food proteins, pollens, etc.) manifested by urticaria, bronchial asthma, and general collapse. Anaphylactoid reactions to intravenous injections, and frequently untoward effects due to drug idiosyncracies are treated favorably with epinephrine. The plant alkaloid, ephedrine, the local and systemic effects of which are almost identical with those of epinephrine, is now being used for what were hitherto regarded as strictly epinephrine indications and is effective by mouth.

THYROXINE.—(Thyroxinum U. S. P.) is used essentially for the same purposes as Thyroid (Thyroideum U. S. P.), the dried gland; however, its dosage may be more accurately determined and results attained more quickly. Thyroxine represents the active crystalline principle of the thyroid; its empirical chemical formula is $C_{15}H_{11}O_4NI_4$, and it has been prepared synthetically. The most pronounced systemic effects of thyroxine are on metabolism. As little as one milligram (0.001 Gm.) will increase the basal metabolic rate in adult man by two per cent; the physiological effect develops slowly and persists for several days. This is quite contrary to epinephrine effects which are relatively transient. Thyroid products are ordinarily administered by mouth as there are no immediate effects produced even intravenously, and the conditions for which they are administered are not of an acute nature.

Thyroid products are indicated in cases of thyroid dysfunction, such as simple goiter, cretinism, and myxedema. In certain types of goiter, particularly exophthalmic, thyroid should not be administered. In thyroid administration, it is important that the protein of the diet be adequate to compensate for the increased nitrogen loss from the action of the drug.

PITUITARY.—(Pituitarium U. S. P.) represents the dried, powdered *posterior lobe* of the pituitary gland, and Liquor Pituitarii U. S. P. a solution of the water soluble principles of the *posterior lobe.* Pituitrin is a common trade name for solution of pituitary. By fractional precipitations two nearly pure preparations, one representing the oxytocic principle and the other the pressor principle of the posterior lobe, have been developed recently. These two preparations have come into commercial use under the names of Pitocin (oxytocin) and Pitressin (vasopressin). Pituitary products for clinical use are ordinarily marketed in ampoule form for hypodermic or intramuscular administration.

Solutions of pituitary are employed in uterine atony, in postpartum and other forms of uterine hemorrhage; they are recommended in shock and other conditions associated with temporary low blood pressure. The pressor effect on blood pressure is more persistent than that of epinephrine. Pitressin in aqueous solution represents the pressor principle of the posterior lobe and has but little oxytocic activity. This preparation is used for temporary stimulation of blood pressure, for increasing the muscular tone and activity of the intestines and bladder, and for its antidiuretic effect in diabetes insipidus. Pitocin in aqueous solution represents the oxytocic principle of the posterior lobe and shows but little pressor activity. It is used to stimulate uterine contractions in obstetrical practice, having particular value when an increase in blood pressure is undesirable.

Pituitary products are standardized on the basis of units per cubic centimeter of the solution. The pressor activity of solution of pitressin is twice that of U.S.P. solution of pituitary, and solution of pitocin has an activity on the uterus equal to that of U.S.P. solution of pituitary. The often described galactagogic effect of pituitary products is not an actual increase of milk production but rather a temporary acceleration of output due to an increased tone of the smooth muscle of the udder.

Extracts of the *anterior lobe* of the pituitary produce no immediate results when injected; however, the relation of the anterior pituitary hormones to body growth and a complex relationship to the gonads and sex functions are definitely established. While still in the experimental stage, preparations of the anterior pituitary hormones will probably have an important clinical value in the future.

INSULIN.—Is a hormone which is secreted by the cells of the islands of Langerhans of the pancreas and which has a vital relationship to carbohydrate metabolism in the body. While the exact chemical nature of insulin has not been wholly determined, it has been isolated from extracts of pancreas in crystalline form. The commercial preparation is an aqueous solution of the active substance, the potency of which is expressed in units. Dosage of insulin should always be expressed in units rather than in cubic centimeters or minims, because the volume of a dose of insulin containing a certain number of units will vary with the strength of the solution employed.

The characteristic action of insulin by hypodermic method is a prompt reduction in blood sugar, thereby controlling hyperglycemia from any cause. Its exact mode of action is not understood; it may possibly cause some change in the character of dextrose so as to make it more reactive and thus more available to the tissues. When properly employed, insulin is a specific treatment for diabetes mellitus. There is no average dose of insulin for diabetics. Each case must be an individual study, and the dosage must be based upon the dextrose tolerance of the individual and the amount of dextrose in the diet. Overdosage may produce serious hypoglycemia. There is no positive evidence that insulin will arrest the diabetic process or restore antidiabetic function. It will, however, maintain the diabetic patient in a reasonable state of health during its administration. Unfortunately, insulin is inactive by mouth and must be administered parenterally, usually hypodermically.

PARATHYROID.—Preparations in the form of dried gland products for oral ad-

ministration and extracts for hypodermic and similar administration are available. There is little evidence that the one definite parathyroid function, the normal concentration of blood calcium, can be influenced by parathyroid preparations taken by mouth. The hormone concerned, *parathormone,* has not been obtained in sufficiently pure form to determine its chemical nature. It is a stable substance, apparently a protein compound, which may be extracted from the gland and prepared in a stable, standardized, aqueous solution for hypodermic use. Standardization in units is based upon capacity to increase the blood calcium of normal dogs.

Recognized commercial preparations by different manufacturers include Para-thormone, Parathyroid Hormone, and Paroidin. These aqueous solutions are for subcutaneous or intramuscular use. The near future should furnish evidence as to the clinical usefulness of parathyroid preparations in a number of conditions. The danger of hypercalcemia which may be induced by overdosage necessitates care in administration comparable to that of insulin. The larger dosage should be based upon blood serum calcium determinations. Clinical cases of both hyperparathyroidism and hypoparathyroidism have been reported. In the latter, the characteristic symptom is muscular tetany associated with a fall in blood calcium. Postoperative tetany has been referred to this cause and treated successfully with parathyroid hormone. In addition, infantile and maternal tetany are reported to be benefited by parathyroid preparations. Other conditions in which parathyroid hormone has been used experimentally with inconclusive results are chorea, lead poisoning, hemorrhage, gastric and intestinal ulcers, and delayed wound healing. The aqueous preparations are potent products and excessive dosage must be avoided.

OVARY.—The various structures of the ovary elaborate several hormones which regulate the female sex activities. Two of these at least, *theelin* and *progestin,* have been sufficiently studied and their influences demonstrated experimentally to warrant recognition. Theelin, termed the follicular hormone, is especially abundant in the follicular fluid although it is widely distributed in the tissues and other body fluids, being especially abundant in the placenta and in the urine of pregnant women and the pregnant mare from the latter of which it is prepared. Theelin has been isolated in crystalline form and given the chemical formula, $C_{18}H_{22}O_2$. A hydrated form, $C_{18}H_{24}O_3$, known as *theelol* is also recognized. Various other names have been applied to this sex hormone, such as folliculin, oestrin, amniotin, menformon, and prygnon. Theelin is the nonproprietary physiological name. This hormone is probably formed throughout life from the fetal stage to the climacteric stage. It controls the development of the female genitalia, estral cyclical changes, and secondary sex characters.

The ovary of pregnancy further elaborates specific hormones in the corpus luteum, of which *progestin* (corporin) is the best known. Progestin has no estrogenic action; its action follows that of theelin, as it is concerned in the implantation or nidation of the fertilized ovum upon the uterine mucosa. Other hormones of the corpus luteum have been described which inhibit ovulation during pregnancy and relaxation of the pelvic ligaments in preparation for parturition. The name *relaxin* has been applied to the hormone related to the latter process. It should be stated that the anterior pituitary hormones have a definite interrelationship with both theelin and progestin in reproductive functions. The production of both is controlled by a gonad-stimulating hormone or hormones of the anterior pituitary. One hormone (prolan A) is said to cause ripening of the follicles and the production of theelin while another (prolan B) causes luteinization and formation of progestin. The periodic nature of follicular growth and ovulation seems to be dependent primarily upon a cyclical activity of the anterior lobe of the pituitary (hypophysis). Various preparations of the ovary of animals have been used in the treatment of conditions thought to be due to ovarian dys-

function. Preparations of the whole ovary, corpus luteum, follicular fluid, and ovarian residue have been employed.

Rational as ovarian therapy may appear from a theoretical standpoint, clinical results are not striking. The oral administration of desiccated ovary or any of its parts seems to be quite ineffective because possibly the activity of the fresh gland may not be present in the dried product or may be destroyed by the digestive juices. The oral administration of extracts seems to be effective in dosage of several times the hypodermic dose. Much work has been done toward the elaboration of potent, standardized preparations of the constituent parts of the ovary. Considerable success has been obtained with the follicular hormone, theelin, which is obtainable for hypodermic use. Extracts of corpus luteum show promise; however, the clinical field of usefulness of ovarian products has not been sufficiently defined to warrant their extensive use. A complicating factor in their rational use is the but slightly understood functional interrelationship of the ovarian hormones with those of the anterior pituitary and other endocrine organs.

PLACENTA.—Ordinarily biologists have regarded the placenta merely as a device for metabolic exchange between the mother and the developing fetus. In recent years it has been conclusively demonstrated that the placenta is a rich source of hormones which it either stores or produces; experimental work favors the latter premise. An active sex hormone, ***emmenin,*** has been demonstrated in the placenta which seems to have an accentuating influence on theelin production during pregnancy; the latter in turn has definite relation to the functional activities of that state. Emmenin differs from the other known sex-stimulating hormones in that it is active when administered by mouth, a fact in its favor. It is effective as an ovarian stimulant without tendency to pathologically excessive effects and, while still in the experimental stage, may prove highly valuable in certain sexual abnormalities in the female.

The apparent production of ***theelin*** and ***emmenin*** by the placenta does not comprise its complete hormone activities. A third hormone with properties similar to the sex-stimulating hormone of the anterior pituitary has been demonstrated. It has been provisionally termed the ***anterior pituitary-like hormone.*** Unlike emmenin it has a striking stimulant effect on the primary sex organs of the male as well as female. The hormone-producing or storage functions of the placenta and their relations to other hormones influencing reproductive functions presents a complex field of sexual physiology, a better understanding of which may lead to important therapeutic developments.

MAMMAE.—Hormone relationship to mammary gland development and lactation has been much investigated during the last decade. Data and conclusions are at variance. The trend of evidence, however, is that the first phase of mammary gland development in pregnancy is due to ***theelin*** whether derived from the ovary or placenta. This hormone will stimulate the gland cells in both sexes either in the absence or presence of the gonads. ***Progestin*** seems to work synergistically with theelin in accentuating the gland development. ***Theelin,*** alone, however, cannot carry the development to the final stage of milk secretion. The final stages culminating in actual lactation seem to be entirely under anterior pituitary control. The anterior pituitary lactation hormone is distinct from the growth or sex-stimulating hormones of the organ. This third hormone has been designated ***prolactin*** and is essential for lactation in mammals. Its activity has been conclusively demonstrated by experiments with rabbits and guinea pigs.

The preceding statements refer to the control of mammary gland development and lactation by outside hormone influences. The further question as to whether the glands in turn exert a humoral influence on other processes has been considerably discussed. A mammary hormone has been accredited with causing a persistence of the corpus luteum which holds in check the cyclic reproductive processes in certain species during lactation. If such a hormone is

produced, it would seem to be relatively inefficient in many instances. No active principle has been isolated from the lactating gland although mammary substance, desiccated and as extract, is available for therapeutic use. While the mammary preparations do not increase milk flow, they are reported to influence certain uterine activities and will often control menorrhagia.

As a closing comment, the author would like to state that, in this review of endocrine therapy, it has not been the purpose to attempt complete analysis of the present knowledge of the endocrine activities and therapeutic applications. Certain organs and tissues accredited with endocrine relationships have not been mentioned. Without going too far afield, an attempt has been made to summarize some of the general principles of endocrinology and facts based upon careful experimental observations rather than mere theory regarding endocrine functions and therapeutic possibilities. Doubtless the increasing physiological knowledge of chemical regulation in body functions marks not only an advance but a rather complete change in many interpretations of functional phenomena. This naturally means a change of viewpoint in regard to corrective measures which of course must follow physiological advance. Endocrine therapy as a whole may now be regarded as only in the experimental stages. With advancing knowledge of endocrinology and improved techniques in extraction and preparation of organ products, clinical medicine will undoubtedly lean heavily in the future on endocrine therapy, and considering the complex hormone inter-relationships, one may infer that much of the therapy will be of the pluriglandular type.

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Catheterization of Old Horses

Not so long ago I was called to treat a case in which the patient was a gelding well past twenty years of age. The history was that he had had anorexia for a few days previous to my visit, when I arrived about noon, he was showing mild colicky pains, but was not in very much distress. And to make a long story short, I spent the entire afternoon applying my regular line of treatment, that usually gives me good results in such cases. But to my vexation, the symptoms gradually continued to get worse. At no time had the patient manifest a desire to urinate. But just about dark he manifested some symptoms that caused me to think of a distended bladder, so I proceeded to pass a catheter and removed a considerable amount of rather thick urine, about twenty minutes later I could notice a turn for the better, which continued and at midnight he was standing up to the manger eating his hay as though nothing out of the ordinary had happened, and I left for home thinking that possibly 12 hours had not been spent in vain; as I feel perfectly confident that if I had not resorted to passing the catheter in this case that before morning the existing horse shortage in West Virginia would have been greater by one. My client was well pleased as the old horse was a family keepsake. The symptoms, treatment and final outcome of this case leads me to believe that possibly catherization is not resorted to as frequently as it should be when we are called on to treat aged geldings.

Rembrandt Morgan.

Winfield, W. Va.

Abdominal Surgery in the Dog*

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WHILE the purposes for which operations are performed in a veterinary hospital and in a surgical research laboratory are usually quite different, technically, the surgical procedures should be comparable. The major ideal is the same, namely, to perform the surgical procedure with minimal discomfort to the animal and to obtain the maximal result from the operation. In the presentation of this clinic we desire to discuss the general principles of surgery, to describe the routine surgical procedure of opening and exploring the peritoneal cavity of the dog, and to demonstrate one operation, an intestinal anastomosis. Although the methods which we describe may seem detached, highly specialized, and impractical to the practicing veterinary surgeon, it should be recognized that a surgeon can and usually does modify various surgical methods to apply to his specific needs.

There are a few general principles that should be thoroughly respected by anyone performing operative procedures on animals. Briefly, these are as follows:

1. Adequate anesthesia should be maintained during all surgical procedures except those in which the discomfort produced by the anesthetic agent is greater than the operation itself. Although the ideal anesthetic agent has not as yet been discovered, there is such a large array of anesthetic drugs that a good one is available for every purpose. All of these drugs are comparatively safe as regards the life of the animal, and there is no excuse for not giving the animal the benefits which their use entails.

2. All surgical procedures should be carried out with as good aseptic technic as the conditions under which the operation must be done will permit. Infection of an operative wound not only jeopardizes the life of the animal and delays healing, but also adds to its discomfort. While infection will occasionally occur even with excellent surgical technic, it should be the duty of everyone operating on animals to acquire sufficient knowledge and skill in regard to surgical procedures to reduce the occurrence of infection to a minimum.

3. Complete hemostasis should be maintained. Not only is the life of the animal endangered by loss of blood, but the healing of the operative wound is often delayed.

4. Trauma to the tissues in the operative field should be reduced to a minimum. Much of the traumatized tissue dies and must be absorbed. This complicates and delays healing, as well as inviting infection. Cutting instruments should be sharp, preferably only a sharp knife should be used, and only sufficient tissue should be grasped by hemostats to occlude the bleeding vessel.

5. The operative incision should be sufficiently large to give adequate exposure. A large incision, when properly made and sutured, heals so readily and is so safe that there is no longer any excuse for performing a poor operation, and causing undue trauma by operating with inadequate exposure of the part on which the operation is to be performed.

The anesthetic.—As previously stated, there is a good anesthetic agent for every type of operation, and each operator can select those which suit his needs best. For simple operations we use one of the local anesthetics, usually employing the infiltration method. One of the many newly-developed anesthetic agents can also be used intravenously; the effect from these drugs is often quite prolonged. For all major operations we employ ether. For many years we have

*A surgical clinic given August 18, 1933, before the meeting of the American Veterinary Medical Association, Chicago, Illinois.

used an auto-inhalation method of anesthesia, devised by McGrath and described by Mann and by Hardenbergh and Mann. Since the method has been described previously, we will mention only the important details. Essentially this method consists in preliminary etherization of the animal in a closed cabinet. The animal is then placed on the operating table and intubation is performed with a metal tube to which is attached an ether can with a two-way outlet (figs. 1 and 2). No drugs other than ether are used.

Preparation of the field of operation.—It is essential that all hair be carefully and cleanly shaved from the field of operation. If possible this should be done on the day preceding operation. Many methods have been devised in attempts to sterilize the skin in the field of operation. Results will probably be better if it is recognized that it is impossible as a general rule to sterilize the skin preparatory to operating, since cultures of bacteria from the hair follicles of the skin may usually be obtained regardless of the method of preparation employed. It is much more profitable to direct efforts to reduce to a minimum the contamination of the sterile tissues beneath the skin by débris and bacteria from the surface of the body. The most that can be accomplished by any method of preparation of the skin for operation is to remove the contaminating débris of the skin which may be carried into the wound, and to make a thin veneer of antiseptic through which the incision can be made into the skin and subcutaneous fascia to the sterile tissue beneath. The cleansing of the skin can be accomplished by sponging with any good fat solvent, such as benzine, gasoline, or preferably, because it is not inflammable, carbontetrachloride. Any one of a large group of antiseptics can be used for preparing the cutaneous surface for operation. We still use iodine, although many surgeons prefer one of the more recently developed antiseptics. We found many years ago that tincture of iodine was not desirable for use on the skin of the dog. The alcohol evaporates so slowly that not infrequently the solution would run down and accumulate in the folds of the unshaved portions of skin and produce an aggravating blister. In order to obviate this difficulty we make a 2% solution of iodine in ether and apply this twice with a sponge over the shaved region. This solution never injures the skin, the ether evaporates so quickly that it never runs down on the unshaved skin, and blistering does not occur. The only disadvantage we have found with the ether solution of iodine is that unless the container is kept tightly corked, the iodine will become too concentrated by the evaporation of the ether. This possibility can be obviated by using freshly prepared solutions only. When the skin is prepared with the iodine and ether solutions it should present a rich, mahogany color.

The abdominal incision.—After the operative field has been prepared, sterile sheets are draped over the animal, covering it completely except for the prepared area of skin, which is then covered with towels, with the exception of the narrow strip at the site of the proposed incision (fig. 3). The sheet and towels are held in position with clips. The type of abdominal incision employed depends on the proposed operation. A median line incision is the easiest to make in the dog, and usually permits sufficient exposure to accomplish the majority of operative procedures on the contents of the abdominal cavity. The incision is carried through the skin and subcutaneous fascia with one or two bold strokes of the knife. The knife is then laid aside, and all the fine bleeding points of severed blood vessels are caught with hemostats. The remaining exposed surface of skin is completely covered with sterile towels. These skin towels are folded and the clamps holding them securely to the cut edges of skin are placed between the folds of the towels in order to avoid catching sutures, ligatures and so forth, on the handles of the clamps. It should be emphasized that only the line of incision is left exposed, all the cutaneous surface being covered with sterile towels. As previously stated, it is impossible to sterilize the skin and the only purpose of the preparation of the skin of the operative field is to permit the incision through the skin with as little contamination of the wound as possible. As soon as the incision is carried through

the skin, it is possible to make a sterile operative field with sterile towels, but it is essential that all the skin be covered with towels.

As the skin of the dog is liable to blunt the sharp edge of the knife used to incise it, we have found it advantageous to use a separate knife to make this incision. We use paring knives of steel, with an aluminum handle. They are cheap, will withstand repeated grinding to maintain their edge, and can be boiled. The use of a special knife for the skin serves two purposes: it saves the edge of the scalpel for the more delicate part of the operation, and any knife used to cut the skin may have some bacteria clinging to it which may infect the deeper wound.

As soon as the skin is completely covered with sterile towels, the scalpel is seized and the incision is carried completely through the abdominal wall and the few bleeding vessels encountered are caught with hemostats. Care is taken to make the incision straight and clean, avoiding the making of jagged edges of tissue which heal slowly. Care is also taken not to include any more tissue in the bite of the hemostats than is absolutely necessary to close the vessels, because one of the essentials for good healing of the wound, as was previously stated, is to reduce the traumatization of tissues to a minimum.

Exploration of the peritoneal cavity.—It is often desirable to explore the peritoneal cavity, although occasionally such a procedure is contraindicated. Of course, this need not be done if the operator knows exactly what he is going to do, and should not be done if it is unnecessary for the purpose at hand and there is danger of spreading infection. It is desirable to establish a routine method in exploring the abdominal cavity, for only by so doing can the procedure be accomplished quickly and effectively and the operator be certain he has ascertained the condition of the most important organs within the abdomen. The gloved hand should always start at one place and pass quickly and gently over the contained organs. With a little practice it is not difficult to acquire sufficient skill to recognize all the important organs in the peritoneal cavity by touch and palpation and to determine whether or not they are normal. The different portions of the gastro-intestinal tract are probably the most difficult to recognize in the dog, and often it is necessary gently to expose them to the eye to make recognition certain.

We use the following method for locating and recognizing the various portions of the gastro-intestinal tract. With the right hand the edge of the greater curvature of the stomach, which usually protrudes into the upper angle of the wound, is grasped firmly and placed gently on tension. The index and companion finger of the left hand are passed over from above downward to the caudal fixed point of the stomach. These digits will then be encircling the lesser gastro-hepatic ligament, and the pylorus can be palpated with the thumb. The left hand is now passed caudally and the first portion of the duodenum is encountered. This structure can be recognized by its thick wall and the attached pancreas. As the duodenum is freely movable in the dog, it can be pulled up into the wound with the left hand. The stomach is now released and the right hand grasps the duodenum, passing caudally over its entire length to its caudal point of fixation. This fixed point is the ligament of Treitz. With the left hand holding the exposed duodenum, the right hand slips over the intestine as it passes through the ligament of Treitz and encounters the first loop of jejunum. The correct location of this structure is necessary when making a gastrojejunostomy. As soon as the jejunum is located, the palpating finger can pass, if necessary, along the entire length of small intestine to the next point of fixation which marks the ileocolic juncture. Single loops of jejunum and ileum are difficult or impossible to recognize, but upper and lower loops of small intestine can be distinguished because the wall of the intestine becomes thinner from the duodenum caudally, and the size of the branches of the mesenteric vessels, as well as their pattern, also vary in a characteristic manner from the jejunum to the terminal portion of the ileum. The terminal portion of the ileum can be recognized by the presence of a longitudinal artery. The large in-

testine of the dog can be recognized by its size, color, and arrangement of its blood vessels.

Resection of a loop of intestine.—Surgical technic can be compared to the old adage about a chain being only as strong as its weakest link. An operation may be performed perfectly except for one little detail, but failure to perform that detail correctly may be fatal. There are many important details that must be thoroughly understood and constantly kept in mind when operating on the gastro-intestinal tract. Failure to carry out any one of these details properly may result in an unsuccessful operation. We shall attempt to emphasize the most important details that are essentiail in performing an operation on the gastro-intestinal tract. It is difficult to present a description of any operative technic completely with all the details; it is essential to perform an operation to ununderstand it completely.

Technic of Operation

Knowledge of the histology of the normal gastro-intestinal tract is essential for a correct understanding of proper suturing of the structure. It should be remembered that the walls of the intestine are composed of four distinct histologic structures: The serosa, muscularis, submucosa and mucosa. The serosa is but the reflection of the peritoneum around the intestine, and is composed of a single layer of mesothelial cells on a connective tissue base. The muscularis is composed of a circular and longitudinal coat of smooth muscle and is the essential mechanism for propelling the food through the intestine. The submucosa is composed of connective tissue, and affords the pathway for the blood vessels, lymph channels and nerves. The mucosa is the absorbing structure of the intestine and, completely surrounding the lumen, comes into direct contact with the intestinal contents.

Surgically, two of these histologic structures of the intestine, the serosa and submucosa, are of the greatest importance; as a matter of fact without these, surgery of the intestine would be extremely difficult or impossible. The serosa is important because it is the histologic element that seals a wound made in the intestine. It is thus of prime importance in the process of healing and the prevention of infection. Without the serosa, wounds of the intestine would rarely heal within a sufficient time to prevent a fatal infection. Within a few minutes after a wound is made in the wall of the gastro-intestinal tract, the serosa, with the aid of fibrin from the lymph or blood, has securely sealed the traumatized surface together. The submucosa, composed of connective tissue which is the supporting tissue of the body, is the only structure in the wall of the intestine that will hold a suture securely. Without the submucosa it would be difficult to suture a wound of the gastro-intestinal tract sufficiently tight and secure to permit healing. With these facts in mind it is evident that care should be taken, in repairing a wound of the intestine, that the serosal surface is not unduly traumatized and that the serosal edges are in apposition, so that the wound will seal and the edges heal together. It is also essential for every suture, which is to hold the edges of the intestinal wound together, to include the submucosa.

TO OPERATE successfully on the gastro-intestinal tract, it is essential to be constantly cognizant of the fact that the gastro-intestinal contents are teeming with bacteria, many of which are pathogenic. Anything that touches the mucosa of the gastro-intestinal tract must be considered as being contaminated. None of the contents of the gastro-intestinal tract must be permitted to leak into the peritoneal cavity. This is of particular importance in regard to gastro-intestinal surgery in the dog, as this species is very susceptible to fatal peritonitis resulting from peritoneal contamination of gastro-intestinal contents. In order to obviate this fatal result it is essential that: (1) all procedures involving exposure of the peritoneal cavity and its contents be done before the lumen of the intestine is entered, (2) the immediate operative field be limited to as small an area as is consistent with the necessary surgical procedures, and all the other exposed tissues be protected with packs, and (3) everything that comes into contact with

the mucosa, instruments, sponges, sutures, the operating fingers, and so forth, must be sterilized, discarded, or thoroughly cleaned after the wound in the mucosa is closed, and thus should not be permitted to come into contact with the tissues not in the immediate field of operation.

There are three important facts among many which must be observed in suturing a wound in the intestine: 1. The mucosa must always be returned to the lumen of the intestine. An edge of mucosa, be it ever so small, not covered with the serosa is almost certain to cause fatal peritonitis in the dog. 2. The sutures must be placed sufficiently close together and tightly enough not only to prevent leakage of the intestinal contents into the peritoneal cavity, but also to hold the edges of the wound together against the pressure of the intestinal contents and the pull of peristalsis until healing has occurred. 3. Adequate blood supply to the suture line must be maintained in order that healing may take place. Fatal peritonitis has often ensued owing to leakage of an intestinal anastomosis because of impairment of the blood supply to a suture line.

It should be remembered that the purpose of an intestinal anastomosis is to maintain the continuity of the gastro-intestinal tract for the passage of the intestinal contents. Too often anastomosis is performed perfectly in every respect except that the lumen of the intestine was not maintained and fatal obstruction occurred. Also, it must not be forgotten that intestinal obstruction can just as surely occur owing to trauma at the site of operation and the resulting adhesions.

AN IMPORTANT part of a surgical procedure on the contents of the peritoneal cavity relates to abdominal packs and to their correct usage. It is absolutely essential that packs be used in many operations, not only to afford sufficient exposure, but also to protect the peritoneal cavity from contaminated material. Many kinds of abdominal packs have been designed. One of the essentials of a good pack is that it should stay where it is placed. The slipping of an abdominal pack over the peritoneal surface is a frequent cause of trauma and is thus a fruitful cause of subsequent adhesions. We have found that the wash cloths of Turkish toweling that can be purchased so cheaply make excellent abdominal packs for the dog. The surface of these wash cloths is sufficiently rough to hold them in position. Our experience with moist and dry abdominal packs is slightly at variance with current surgical opinion. In the dog, moist packs will frequently cause edema of the cells of the peritoneum even if isotonic saline solution is used. This edema frequently injures the peritoneal cells to such a degree that adhesions will occur. Dry packs may traumatize the walls of the peritoneum, but the trauma causes an exudate and fibrin to be thrown out which protects the cells, and the fibrin is so firmly attached to the pack that it clings to it when the latter is removed. Consequently, in the dog, when we particularly desire to have a minimum amount of adhesion occurring after a surgical procedure, we employ dry abdominal packs. Dry packs are also used around an intestinal wound to take up the intestinal contents. We use moist wash cloths of Turkish toweling to protect the abdominal contents immediately on incision of the peritoneum.

ONE of the important questions a surgeon must decide in restoring the continuity of the intestine is the type of anastomosis. There is no question but that an end-to-end anastomosis is easier to make; there is less mucosa exposed and less soiling with intestinal contents; usually fewer adhesions form at the site of anastomosis, and the net result, when properly done, gives a better appearance than a lateral anastomosis. However, it takes more experience to perform an end-to-end anastomosis successfully than the lateral anastomosis. There is always the tendency in performing an end-to-end anastomosis of the intestine to pull the suture too tight, making a purse-string of the suture line. The lumen of the intestine is thereby decreased or completely obstructed. For this reason, unless the operator has acquired considerable skill, which can only be gained by operating, the lateral anastomosis

is preferable even though there is necessarily a much larger area of mucosa exposed and a longer time consumed in making the anastomosis. There is only one serious objection

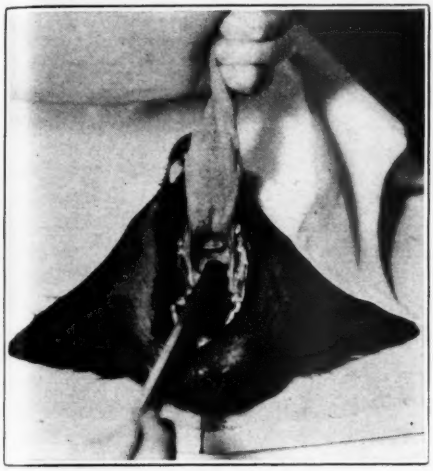

Fig. 1.—Method of intubating a dog. Three things are essential: (1) the animal should be sufficiently anesthetized so that oral reflexes are abolished; (2) the animal must be placed straight and securely on its back; (3) the tongue should be pulled out of the mouth parallel with the long axis of the body.

to the lateral anastomosis in the dog; the tendency, in making a lateral intestinal anastomosis, to leave the blind ends of the intestine extending too long on each side of the stoma. As the dog swallows bones or other hard objects that not infrequently become firmly wedged into the distal blind end of the anastomosis, these necrose through the wall of the intestine, causing fatal peritonitis. The method of avoiding this difficulty is both obvious and simple. We do not leave any blind ends, but extend the stoma to the line of suture closing the ends of the intestine.

The length of intestine resected in an operation depends, of course, on the character and extent of the lesion for which the resection is done. For the purpose of demonstration we resected a loop of intestine supplied by one of the larger branches of the mesenteric artery. The loop is exposed, and the remaining contents of the peritoneal cavity are carefully and completely protected with abdominal packs. The blood vessels at each end of the exposed loop, which connect to the branch of the mesenteric artery supplying the adjacent loop proximal and distal to the loop to be resected, are ligated. The branch of the mesenteric artery supplying the exposed loop is then doubly clamped, sectioned, and ligated. The mesenteric attachment is now cut. Heavy crushing clamps are placed across the intestine, two at each end of the loop. One clamp is placed at each end as near as possible to the site of ligation of the mesenteric blood vessels, and another clamp is placed parallel to each of these and separated from them only by the thickness of a knife blade (fig. 4). At this stage of the operation, the operative field is very carefully packed off. This procedure is exceedingly important in order to prevent contamination from intestinal contents. The intestine is sectioned at each end between the clamps and the resected loop of intestine is discarded. The two remaining clamps are carefully sponged to remove any contaminating débris which may be present.

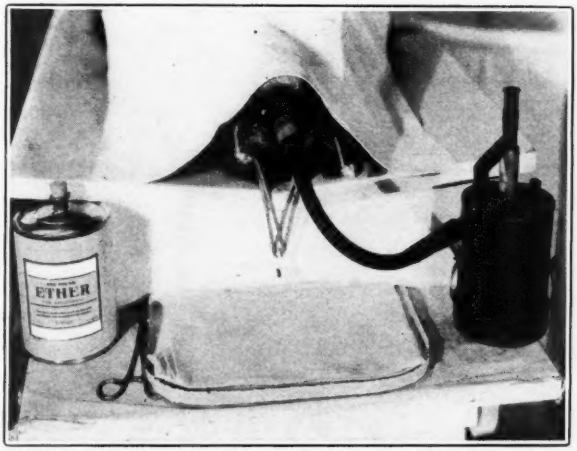

Fig. 2.—Etherizing apparatus after intubation is completed and tube is connected to the ether can.

Fig. 3.—Prepared operative field just prior to making the skin incision. The small amount of skin surface exposed may be noted. After the incision is made through the skin and superficial fascia, the remaining skin edges are covered with sterile towels.

NUMEROUS methods have been described for performing an intestinal anastomosis. There is probably no one best method, except so far as an operator has preferred certain methods and perfected his technic accordingly. The important point is for the operator to learn the fundamental procedures necessary in restoring the continuity of the intestine and then to perfect his skill in using the method which best suits his needs and ability.

We shall describe the method which we have used for several years and called the "two-needle technic." After the resected loop has been discarded, the ends of the intestine are closed. Many methods have been developed for closing the severed ends of the intestine. The essentials to consider are to close the lumen tightly and to minimize the possibility of contamination from the mucosa and intestinal contents. Many of the methods devised are not very satisfactory in the dog because the muscularis of the intestine is so powerful in this species that the pressure produced by peristalsis frequently will force intestinal contents through the line of closure before healing has occurred. The method we shall describe is one which we usually employ because in our procedure leakage never has occurred.

The clamp which was placed on the intestine prior to section is left in position, and the closing suture is started by taking the first stitch just under the tip of the clamp. A continuous double mattress suture, that is, one that passes back and forth, is thus placed just under the clamp across the entire width of the intestine and tied with the free end under the tip of the clamp. The clamp is then removed, and the crushed edge of the mucosa is inverted with a continuous mattress suture (fig. 5).

AFTER both ends of the intestine are closed, they are placed in apposition and parallel to each other, but pointing in opposite directions. The length of overlapping depends on the length of lumen of the anastomosis desired. This is usually considered to be about equal to three times the diameter of the intestine. As soon as the ends of the intestine are in proper position the so-called posterior suture is made (fig. 6*a*). This is a continuous suture placed near the mesenteric border. Care must be taken in placing this suture not to occlude too many of the blood vessels. The purpose of this suture is not only to seal the posterior wall of the anastomosis by holding the serosa of the two loops tightly together, but also to serve as a stay suture holding the two loops in apposition.

The area of operation is again limited to the short, double loops of intestine by packing with dry, gauze sponges. An incision is made through the wall of each loop. The incision is made in each loop as near as possible to the suture line just completed and extends to the very tip of the closed end of intestine. Theoretically, the incision into the

intestine should be made with a knife, but, practically, we found that in the dog it is much easier to open the intestine with scissors.

After each intestinal loop is opened the blood and intestinal contents are carefully sponged away and the next suture is started (fig. 6*b*). This suture is long, and has a needle in each end. In most methods of intestinal anastomosis the suture used to close the mucosa begins at one of the angles of the line of anastomosis. It is thus necessary to make the final closure and tie at the other angle of the anastomosis. This particular part of the line of anastomosis is not only most difficult to close, but it is also more prone to be defective and permit leakage of the intestinal contents. For this reason we use the suture with two needles and begin the suture line at the center of the posterior wall. The closing suture and knot thus are placed in the middle of the anterior line of suture. This suture is started in the middle of the line of suture on the posterior wall and passes back and forth as a continuous mattress suture, using one needle to suture in one direction and the other needle to suture in the opposite direction (fig. 6*c*).

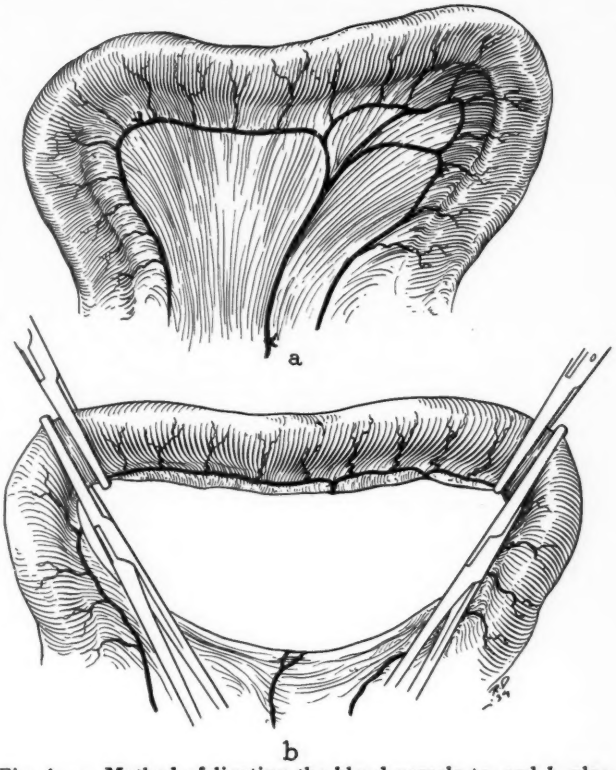

Fig. 4.—*a*, Method of ligating the blood vessels to, and *b*, placing the crushing clamps on, the intestinal loop prior to resection.

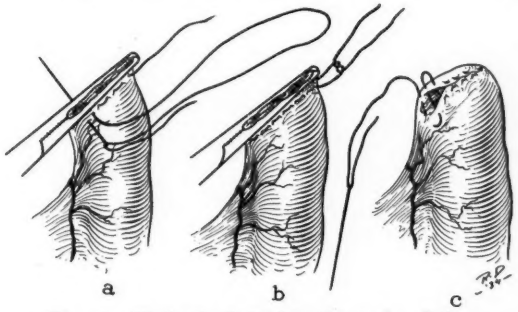

Fig. 5.—Method of closing the ends of the sectioned intestine.

WE USE the inverting suture (Connell) to turn in the mucosa. In the dog, as previously stated, it is essential that all the mucosa be returned to the lumen of the intestine before removing the packs and preparing the operative field for the final suture. Extension of the contaminated field, as will ensue if any mucosa is exposed at this stage of the operation, will often lead to infection and fatal peritonitis. This inverting suture is nothing more than a continuation of the continuous mattress suture

which was used in the posterior wall and in which the loop of the suture is placed on the mucosal side (fig. 6*d*). This suture line is not difficult to place provided the operator constantly keeps in mind the position of the needle, in regard to whether it is within or without the lumen of the intestine, and takes care to roll the mucosa inward with each stitch when the suture is pulled taut. To facilitate the placing of this inverting suture, now completely joined with two rows of suture.

IT IS not necessary and usually not advisable to close the opening in the mesentery of the dog. This structure is so delicate in this species that suture is difficult, and not infrequently in attempting to repair it the return of blood from the site of anastomosis is interfered with because of compression of the small mesenteric veins.

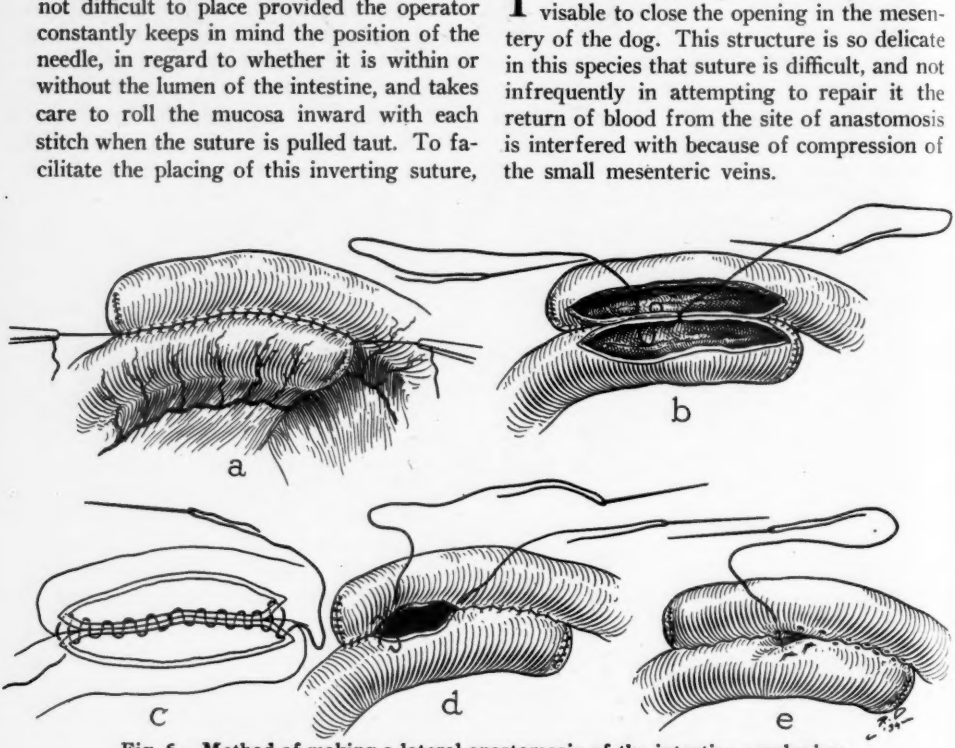

Fig. 6.—Method of making a lateral anastomosis of the intestine employing the two-needle technic.

it should be noted that the length of a stitch, that is, the distance parallel to the line of incision, should be equal to the depth of the stitch, that is, the distance at right angles to the line of incision, and both should have a relationship to the diameter of the suture.

After the mucosa has been inverted, the entire operative field should be cleansed by removing all soiled sponges, instruments, and so forth, and the surgeon and his assistant should wash their hands carefully. The anterior and final suture is now made, beginning at one angle of the anastomosis at the knot of the first placed and posterior suture, and passing with a continuous mattress or other suitable suture over the entire anterior line of the anastomosis to the opposite angle (fig. 6*e*). The anastomosis is

We have not mentioned the use of intestinal clamps because we have discarded them in intestinal work in the dog, except when it is desirable to employ them to occlude a loop of intestine at a distance from the operative field, for the purpose of preventing the passing of intestinal contents. We have found it difficult to secure clamps of a size suitable for the intestine of the dog and which, owing to the thickness of the walls of the dog's intestine, will not produce trauma. We have also not mentioned the kind of suture material used in making the anastomosis. Linen, silk, or fine catgut can be used satisfactorily. Each has its advantages and disadvantages.

Many methods have been developed for making an aseptic intestinal anastomosis.

We have tried most of these methods and have devised two of our own. Any one of these methods will sometimes be satisfactory, but too often they are not satisfactory and the result is much worse than if the open method which we have described were used. If the operative field is sufficiently and properly packed, there is little advantage in employing any of the more difficult and, too often, less satisfactory aseptic methods.

Closure of the abdominal incision.—Several facts must be considered in developing a routine method for closing the abdominal incision in the dog. A prime requisite is that the operative wound must be closed securely and tightly. It is difficult to immobilize the dog and the operative incision is subjected to stress as soon as the anesthetic is withdrawn. It must also be recognized that occasionally the tissues of the dog will absorb catgut so quickly that, if it is the only suture material used, evisceration will occur. It should also be noted that a suture line in muscle will not stay tight. Within a week after placing a suture line in muscle tissue alone, the suture will have cut through so much muscle that when the suture is pulled on fully, a third of its length can be pulled out before it is again tight. Connective tissue is the only tissue of the body which will always hold a suture line tightly. Therefore, the fascia of the muscle should be sutured and as little of the muscle as possible included in the suture. Muscle should be sutured in the abdominal incision only to fill dead spaces. Finally, it should be recalled that nonabsorbable suture material should only be used in two types of locations: first, in sterile tissue where there is every reason to believe it will not cause infection, as in the peritoneum, and second, where it can readily be removed, as in the skin.

WITH these facts in mind, we have developed the following method for closing the abdominal incision. The peritoneum is closed with a stout linen suture, care being taken not to include muscle. This suture, being placed deep in sterile tissue, rarely causes infection, and being nonabsorbable, will remain in position, so that if properly placed it will keep the peritoneal cavity closed even if the other sutures are absorbed or give way prematurely. The muscle fascia and skin layers are sutured separately with continuous sutures. Care also should be taken not to include muscle tissue in these sutures. Absorbable sutures are used in the fascia because of the probability that there will be some infection from contamination with the skin, and because of their proximity to the bacteria-containing hair follicles. The skin is sutured tightly with linen. This latter suture approximates the cut edges of the skin securely and is placed as near the cut edges as possible, in a triangular fashion, so that it will cut through during the process of healing. In placing the skin suture it is pulled forward in the direction of the suture by an assistant, parallel to the line of incision, and not backward and sidewise. This maneuver prevents puckering and whipping over of the cut edge and makes a much better scar. This suture will come out by itself within seven to ten days after operation.

Unless there is a definite reason for a more pretentious dressing, we use a single, narrow layer of sterile gauze, held in position with collodion, to dress the abdominal wound. This simple dressing prevents contamination of the wound for a sufficient period of time to permit the sealing and preliminary healing of the line of incision and, subsequently, the dressing becomes detached by itself.

The towels which were clamped to the edges of the wound are not removed until the sutures in the peritoneum and muscle fascia have been placed. Soiling by contact with the skin of these sutures which are placed deep in the wound is thus prevented. The hemostats which were used to stop bleeding from the cut edges of the wound are removed by an assistant as the suturing progresses. It is rarely necessary to ligate any of the vessels severed in making a median line incision in the abdomen of the dog. This is fortunate, because healing is retarded when too much foreign material is left in the wound. The knots of ligatures and sutures are particularly prone to prevent healing, and should be left as small as possible in both number and size. The cut ends of the knots extend out into the tissues and invite

infection and prevent healing. For these reasons they should be cut as short as possible. In this connection it should also be noted that absorbable suture material usually produces a more severe reaction in the wound and retards healing more than uninfected nonabsorbable suture material.

Postoperative care.—The main object of the postoperative treatment is to restore the animal to its normal condition as soon as possible. Of greatest aid in achieving this object is quick and complete recovery of the animal from the anesthetic and the immediate effects of the operation. With this end in view the anesthetic is usually withdrawn as soon as the suturing of the peritoneum is completed. As ether is the only drug employed, our dogs have usually recovered from the anesthetic within one to two hours after completion of the operation. We discarded our special recovery room several years ago when we found that it was inconvenient and unnecessary. The animal is taken directly from the operating room to its cage in the kennels. We attempt to maintain the kennels at a fairly constant temperature.

The postoperative treatment, in regard to diet and other measures, depends entirely on the nature of the operation. Unless there is a special contraindication, the animal is permitted to drink water, if desired, immediately after operation. While it is recognized that the taking of water may induce vomiting, if the suturing has been done properly vomiting will not cause any harm and does lavage the stomach. Food is usually permitted the next day after operation. No special diet is required following the majority of operations. However, we have quite frequently found it advisable and, under certain conditions, necessary to maintain the animal on a diet of milk and syrup for several days postoperatively. This diet has been of particular value when the animal was not in good condition at the time of operation.

One of the most important postoperative procedures is the intravenous administration of saline and glucose solutions or the transfusion of blood. These often life-saving measures have been described briefly in another publication.[4]

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Hog Cholera Lesions

The specific gross lesions induced by the filterable virus of hog cholera are difficult to identify because of secondary microbian invaders. Waldmann in Bulletin Office International Epizootic, Paris, reports his findings in an experiment on 285 swine that were inoculated with filterable virus. Of that number 103 were allowed to die, and the remainder was destroyed for autopsy purposes at various stages after inoculation. The first visible lesions were observed on the fourth day after inoculation. The lymphatic glands showed hemorrhages in 93% of the cases. The spleen infarcts of various sizes in 54% of the cases. Subserous hemorrhages were rarely found. 54% showed lesions of the kidney after the fifth day. 49% showed stomach lesions. 5% pneumonic lesions and 5% showed heart lesions.

Extensive inflammation was noted in the small intestine after the fourth day. Peyer's patches showed tumefaction after the seventh day of inoculation. Petechia were numerous and folicular necrosis was manifested by the fifth day. This condition later showed diphtheroids or necrotic foci.

Of the animals showing secondary invasion, 50 were infected with paratyphoid; 34 with suisepticus; 12 with pyocyaneous; 75 with coli and other bacteria, and five showed a general mixed infection.

Waldmann's experiments show that intestinal lesions stand in direct relation with the virus. However, the intestine is particularly liable to secondary invaders. The author

concludes that besides the filterable disease there does not exist a contagious pleuropneumonia of bacterial origin.

The foregoing is a review of Waldmann's experiment as abstracted in Biologic Abstracts and in this abstract it is noted that the lesions produced by secondary invaders is not specifically mentioned, excepting the statement relative to the diphtheric inflammation of the intestine. It is quite difficult with our present knowledge to evaluate the lesions produced by the filterable virus and by the secondary invaders in the ordinary cholera cases.

A very interesting statement in the abstract is that 50% of the 182 inoculated with the filterable virus and destroyed for autopsy were free from bacteria.—A. T. K.

* * * *

The Mineral Requirements of the Dog

It is impossible to estimate individual mineral requirements with absolute precision for the dog. The living conditions vary too much, sizes vary, and the foods available fluctuate.

A practical dietary standard can be worked out and has given good results. This kind of standard has been worked out for the human body and it has been estimated that 0.68 grams of calcium are needed by the body daily or 0.0097 grams of calcium per kilogram of body weight daily. Of phosphorus 1.32 grams are needed daily or 0.019 grams per kilogram of body weight. Of iron the daily requirement is 15 milligrams. Of iodine 15 milligrams *yearly* are sufficient. The Iodine Educational Bureau, Inc., suggest a daily intake for dogs during pregnancy of 0.03 grain of potassium iodide.

The following tables will be found very convenient as the amounts of mineral in common servings of food is given. To know the exact amount eaten is a simple matter of first measuring the food eaten and adding up the number of grams in that amount.

CALCIUM CONTENT

	Grams
Whole milk—1 cup	.292
Whole milk, dried—3 tbsp.	.243
Cheese, American—1⅛-inch cube	.214
Milk, evaporated—3¾ tbsp.	.178
Cauliflower—½ cup, cooked	.100
Rhubarb—½ cup, cooked	.095
Milk, sweet condensed—1½ tbsp.	.093
Molasses—2 tbsp.	.073
Cottage cheese—5 tbsp.	.070
Navy beans—½ cup, cooked	.069
Spinach—½ cup, cooked	.069
Oranges—1 medium	.065
Strawberries—⅔ cup, raw	.055
Turnips—½ cup, cooked	.054
Oysters—⅓ cup	.051
Cream, 18%—¼ cup	.044
Carrots—½ cup, cooked	.041

PHOSPHORUS CONTENT

Milk, whole—1 cup	.226
Buttermilk—1 cup	.220
Chicken—¼ cup, cooked	.213
Navy beans—½ cup cooked	.204
Cottage cheese—5 tbsp.	.185
White fish—6x2¼x½	.176
Milk, dried, whole—3 tbsp.	.175
Beef liver—3x5x⅜	.170
American cheese—1⅛-inch cube	.163
Oysters—⅓ cup	.054
Tuna fish—⅓ cup	.146
Cocoa—2 tbsp.	.141
Beef round—4¾x4½x¾	.138
Salmon, canned—⅓ cup	.127
Milk, evaporated—3¾ tbsp.	.119
Corn, canned—⅓ cup	.105
Graham flour—4 tbsp.	.101
Oats—½ to ⅔ cup	.098
Eggs—1 medium	.085

IRON CONTENT

Spinach—½ cup	.006
Liver, Beef—3x5x⅜	.0059
Lima beans, dried—½ cup	.0050
Navy beans, dried—½ cup	.0042
Oysters—⅓ cup	.003
Molasses—2 tbsp.	.0028
Apricots—9 halves	.0028
Beef round—4¾x4½x¾	.0026
Corn, fresh—½ cup	.0023
Rhubarb—½ cup, cooked	.0019
Banana—1 large	.0018
Beets, fresh—½ cup	.0017
Prunes—2 very large	.0017
Dates—5 medium	.0016
Muskmelon—⅓ medium	.0012
Figs—2 medium	.0012
Raisins—4 tbsp.	.0011
Eggs—1 medium	.0011
Cauliflower—½ cup	.0011

IODINE CONTENT

Deep sea fish, lobsters, clams, oysters, salmon roe, salmon, cod, halibut, and haddock... Yield 200 to 1,000 parts per billion

Drinking water and table salt treated with potassium iodide or sodium iodide yield varying amounts.

Fruits yield low, about 25 parts per billion.

Rachel Palmer.

Gainesville, Fla.

Intussusception in a Hen

This condition was found to have existed in an adult hen submitted for post-mortem examination. The clinical appearance of the bird was that of a hen in fair flesh, showing no external symptoms of disease.

On opening up the abdominal cavity, a portion of the small intestine immediately came into view, where it was seen that an intussusception of the bowel had taken place. From its position it was evident that an upper portion of the intestine had entered into a lower part. The accompanying illustration will serve to point out the structures involved.

The area of invagination was approximately one inch in length and is represented by the cylindrical tumor mass which consists of the sheath and the remainder the intussusceptum. The actual condition can best be pictured by imagining a glove finger which, during removal, is shortened by being drawn into itself without being inverted.

The invaginated portion does not enter the sheath alone, but carries with it its mesentery, which is pressed upon by the sheath, causing a marked interference with the circulation. This part, from passive congestion, pressure and loss of nutriment, was found to be highly inflamed and in some areas partly necrosed.

In suggesting a cause for this condition, one might say that it depends upon vigorous peristaltic movement in one part of the bowel immediately below which the organ is paralyzed. In the subject, it was noticed that the walls of the gizzard were somewhat atonic as well as certain areas of the intestine. The obstruction of the bowel was complete; evidenced by the absence of ingesta in the lower part. Spontaneous recovery could only have taken place by means of a union of the serous surfaces of the upper edge of the sheath to the adjoining part of the healthy intestine, with a subsequent sloughing of the invaginated portion.

L. R. Hutsam,

Government Veterinary Surgeon.

St. Johns, Antigua, B. W. I.

Tumor of the Membrana Nictitans

The eye of a yearling Jersey heifer had a popped or bulging appearance; there was hyperemia of the entire eye and the cornea had an opaque appearance very much like a permanently blind eye and there was a rather small tumor on the membrana nictitans.

The eye was bathed in mild astringent lotions for a few days and then the tumor was grasped with forceps and the surface scarified by cutting rather deeply into the substance of the tumor until there was slight hemorrhage. This process was repeated every fourth day for three times in succession. By this time there was marked improvement in the entire eye. Scarification was discontinued at the time the opacity of the cornea began to gradually disappear, but the daily application of mild astringent lotions was continued for about three weeks longer, which resulted in complete recovery.

Rembrandt Morgan.

Winfield, W. Va.

Mummified Fetus

At the annual veterinary conference, January, 1934, at New York State Veterinary College, Ithaca, a three-year-old heifer, which had carried a calf for over a year was presented.

This heifer was noted last August to have large calf in utero. As time went by, there was no development in the genital organs or of the abdominal girth. On palpitation through the rectum and in the flank, the object seemed like palpitating a bag of cement. No ovaries could be located.

At the conference, this animal was chloroformed and the flank opened as for cesarean section. The uterus contained dry, partially mummified calf, probably eight months old with the wall of the uterus enormously thickened and adherent to the calf. There was an entire absence of any amniotic fluids and the cotyledons were a dirty brown color.

The calf was fully developed and seemed to have a twist. It was thought there had been a torsion of the uterus which accounted for the death of the calf and the conditions noted.—W. V. P., New York.

Sick Elephants

On October 12th a fellow veterinarian and I were called to see some sick elephants belonging to Ringling Bros. & Barnum & Bailey Circus which was showing in our city that day.

Upon our arrival at the circus grounds at 12:30 P. M. we found, beginning at one end of the line there were fourteen consecutive elephants sick. The total number of elephants in the circus were forty. The history for the entire season was negative. After having been fed No. 1 timothy hay and given city water all animals were loaded at about 10:00 o'clock the night of the 11th and shipped one hundred miles into Charlotte. At 10:00 A. M., October 12th, all animals were on the circus grounds and being fed bright clean looking No. 1 timothy hay and given city water. The first illness was noticed in three animals exactly two hours after feeding was begun. Eleven others were ill within the next thirty minutes.

Symptoms.—A clinical picture of a central nervous system intoxication was first noted. Eight animals were apparently desperately ill; staggering, incoordination of all body movements, from an incoordinated movement to a complete inability to move the snouts was a constant symptom, mentally excited, a twitching of the ears, lips and eyes, slightly bloated, cold extremities, rapid shallow breathing, rapid arythmic heart beat, from a partial to a complete inability to swallow, drooling, mucous membranes injected and petechial, dilated pupils, frequent and uncontrollable urination and defecation, a tendency to walk, two became almost uncontrollable until they fell. Five had fallen and were helpless within less than five hours from the onset. After falling they went into a deep coma.

Treatment.—Since it was, in my opinion, a gastro-intestinal intoxication the emptying of the digestive tract was immediately resorted to. This was accomplished by giving purgatives hypodermically and enemas. Polyvalent botulinus anitoxin was given and stimulants administered to those in a coma. Careful nursing.

Laboratory Studies.—Laboratory studies were made of the following: Feces, urine, nasal secretions, smears from mucous membrane, saliva, soil, grass, hay, drainage from a nearby ditch. Due to the interference of the chief of the elephant keepers with the laboratory workers a blood sample was not obtained, consequently and unfortunately no blood study was made. Laboratory animals were fed samples of hay, grass, and water. A careful search for poisonous plants was made. The laboratory findings were negative.

Since there is a keeper for each animal and numerous supervisors the possibility of a chemical poisoning either malicious or accidental apparently is eliminated.

Outcome.—Of a total of fourteen sick, eight were evidently critically ill. Four of these were in a coma very soon after falling. Three of the eight were able to ship at 7:00 A. M., October 13th. Four had recovered sufficiently to return to the circus October 14th. The other one was returned October 17th. The latest reports say they are all apparently in perfect health now. The five above mentioned were all trained animals, ages ranging from fifteen years to seventy years and were valued at $75,000.00.

H. Calvin Rea.

Charlotte, N. C.

Lupinosis in Chicks

About ten years ago, while spending the winter in Pasadena, California, the writer was consulted by a neighbor who was losing young chicks in great numbers.

Out of about 300 chicks, less than 200 were left after only a few days on free range. They seemed well in the morning, but before dark, quite a number would die.

Upon autopsy, the crop was found to contain a seed not found in the grain fed by the owner. These seeds were those of lupines which were growing wild in abundance in the adjoining vacant lot.

The owner was advised to keep the chicks confined to their runs and no more losses followed.

F. G. Steinbach,
Wildwood Crest, New Jersey.

Do You Remember?

1. Question: Who originated the most popular method for concentrating the ova of parasites for microscopical diagnosis?

Answer: A. Leslie Sheather, M.R.C.V.S., Ph.D., London, developed a method in 1923 which, with various modifications, is now commonly used for the examination of feces for parasitic ova.

2. Q.—What are the main steps involved in a fecal examination by this method?

A.—Adding a saturated sugar solution to an equal amount of a strained fecal solution, all of which is centrifuged. By crowding the lighter ova to the top of the mixture, a drop of these may be transferred to a slide for examination under the microscope. Many kinds and varieties of parasites may be identified in this manner by their ova.

3. Q.—What are some of the disadvantages of this method in fecal examinations?

A.—This method requires a little more equipment and time than the smear method. Although parasites may be present, there may be no ova due to immature parasites, diluted stools as in diarrheas or because the ova of tapeworms are usually found within the segments, and therefore are not so commonly seen in these examinations. Oil from laxatives or any other substance that is lighter than the eggs covers them and interferes with transferring the ova to a slide. Only thoroughly cleaned equipment should be used, so that ova may not be transferred from one examination to another.

4. Q.—What are the common names for the following genera: Ancylostoma, Ascaris, Dipylidium, Eimeria, Haemonchus, Heteralsis, Oxyuris and Trichuris?

A.—The common names of the genera are: Ancylostoma—hookworms; Ascaris—roundworms; Diphylidium — tapeworms; Eimeria—coccidia; Haemonchus — stomach worms of ruminants; Heteralsis — cecal worms of poultry; Oxyuris—pin worms; and Trichuris—whipworms.

5. Q.—What symptoms may be present in an advanced case of strongylosis?

A.—General debility characterized by a poor coat, unthriftiness and loss of flesh, inability to work hard or long, periodic diarrhea, anemia, colic and attacks of lameness in either or both of the hind legs constitute common symptoms.

Wesley O. Keefer.

Akron, Ohio.

* * * *

Present Status of Laryngo-Tracheitis

The importance of laryngo-tracheitis in chicks was first brought to our attention in 1924 and 1925 in New Jersey, New York, Rhode Island, Michigan, California and Canada. It probably existed earlier. Salmon, in 1899, and others since, have described an unnamed disease of poultry that fits very well the description of laryngo-tracheitis.

Beaudette in New Jersey and Beach in California, in 1930, reported that this disease is due to a filterable virus, a virus pathogenic also to mice and guinea pigs. There may be other organisms concerned in some outbreaks of laryngo-tracheitis, but the filtrable virus is essential to the occurrence of the disease. Chickens of all ages are susceptible.

The disease is transmitted by contact and the highest incidence is observed at concentration points. Isolated farm flocks are relatively free. However, in farm flocks of 300 birds and upwards, the disease seems to be increasing in Michigan. It is favored by lowered resistance; crowding, unsanitary quarters, malnutrition, parasites and fowlpox vaccination; all contributing factors to severe outbreaks.

The symptoms are difficult respiration, spasms of coughing and expectoration. The temperature may go to 112°F., but is not always markedly above normal. Death is due to asphyxiation. The course of the disease runs from 4 to 21 days. The highest mortality is seen on the fifteenth day.

Few changes are observed in the carcass of birds dead of laryngo-tracheitis, except in the larynx and trachea. The disease was formerly called infectious bronchitis, but because the lesions are not those of bronchitis, Stafseth in 1928 suggested the name infec-

*Notes from an address by W. W. Thompson, East Lansing, Michigan, at the Eleventh Annual Post-Graduate Short Course for Veterinarians, Michigan State College, East Lansing, January 22-26, 1934.

tious laryngo-tracheitis, and because of its appropriateness it was immediately adopted by nearly all writers on the subject.

The loss in egg production usually begins on the fourth day after the appearance of the disease and continues for about 30 days.

One outbreak confers immunity.

Vaccination by hypodermic injection has proved unsuccessful. Vaccination by swabbing the trachea is an efficient means of preventing the disease in those that do not succumb, but the mortality is too high. Vaccination by swabbing the cloaca with a virulent culture has met with success in the hands of most operators.

Vaccination should not be used indiscriminately, but only in flocks in which the disease occurs.

Medicinal treatment is generally unsuccessful. Confining the birds in a building which is kept warm by artificial heat probably lowers the mortality and limits the spread.

Carriers are produced as a result of an outbreak of this disease and it is extremely dangerous to purchase birds from flocks that have passed through the disease and mix them with young birds. Sparrows can carry the disease and they should be kept out of the hen house at all times.

* * * *

Rabies in Horses Rare in New York

I have seen only one case of rabies in the horse in over 30 years of practice. It occurred in a large draft horse, the animal was extremely nervous, staring eyes, champing of the mouth, extreme anxiety, a piece of coal in his manger he chewed to a powder.

Taking a long stick and putting it before him, he would bite it like a dog and hang on. This is sometimes a good test for a dog suspected of having rabies.

In order to watch this horse, we tied him across the stable, a rope fastened to each side of his halter. The nervousness and convulsive contractions of his muscles increased until by spasmodic contractions of the muscles he actually fractured his hip. The owner wished to have him destroyed, the horse being down at this time and in intense pain. Not having a pistol with me, I took a sharp pen knife and reaching in the rectum, cut off the posterior aorta.—W. V. P., New York.

* * * *

Sore Mouth in Lambs

During the past several years an ailment of lambs, usually designated as sore mouth, has been reported from different sections of the country. This disease apparently varies in intensity in different outbreaks. It is of considerable economic importance, principally because of the loss of weight, although the percentage of fatalities in some outbreaks is high. Recently this malady has occurred in Missouri sheep.

There are conflicting views as to the cause of sore mouth. A filterable virus has been identified and is probably the primary factor, although probably various organisms occur as secondary invaders.

The lesions occur on the lips, and may be both on the inside and on the outside of the mouth. The gums and tongue may be involved. The initial lesion consists of papules and the involved tissue becomes necrotic and infiltrated, the surface becoming dry and forming a scab. Beneath the scab conditions are favorable for the development of secondary invaders, both aerobic and anaerobic. Should the *B. necrophorous* invade the lesion the peculiar pungent odor characteristic of necrophorous infection is noted. Suppuration is prone to occur because of the ever-present pyogenic microbes.

The filterable virus disease uncomplicated would probably not be very fatal. Control of the secondary infections diminishes the severity of this malady. A vaccine, the purpose of which is to cause a mild attack of the disease, has been produced at the Texas Experiment Station and, according to reports, beneficial results have been obtained from its use. Until the vaccine has been perfected and is available, it is probable that proper local treatment and possibly the use of an autogenous bacterin may be of value in diminishing the suppurative process due to pyogenic bacteria.

Horse Parasite Control*

HORSE parasite control has been undertaken in Michigan in a modest way. Reports of the success of this work in Illinois and in Iowa led to a demand for it in this state. We have worked upon the control of parasites in horses as being work that the veterinarian should do.

Farm horses in Michigan are getting too old. This has been impressed upon me both by visiting farms and by visiting rendering plants. If these old horses are to give a satisfactory service, it is important that they be free from parasites. It is somewhat difficult for many farmers to understand why parasites so insignificant in size compared to the size of the horse, can really produce much injury.

Parasites produce injury in four ways: (1) by interfering with the function of organs mechanically; (2) by depriving the animal of needed nutrition; (3) by furnishing means of introducing bacteria; and (4) by elaborating toxins.

The preparation of the animal for horse parasite treatment is important. The need for keeping the horse off feed for at least eighteen hours is stressed at all of the meetings and is again emphasized in the notice sent by the veterinarian regarding the time of the treatment. Every effort is made to meet or confer with the veterinarians of the county before any of this work is started, and, if possible, they are induced to agree upon prices and procedures. At the farmers' meetings no attempt is made to stampede or high-pressure the horse owners into signing up for treatment. The problem and its solution are explained, and then agreement forms, which provide for the name, address, and number of horses, are given to representative farmers from each neighborhood with the suggestion that they take these forms home and talk the matter over with their neighbors. Brief mimeographed outlines of the problem and treatment are furnished to these representative farmers for the purpose of refreshing their memories and enabling them to discuss the matter intelligently with the neighbors. The lists or agreements are to be returned to the veterinarian or county agent. If the return is to the county agent and a particular veterinarian is preferred for the work, the preference is to be indicated on the agreement form. We find that when the lists are returned to the county agent's office, we get a better view of the entire situation, and to date there has been no trouble regarding the distribution of the work to the veterinarians from that point.

We have steered clear of expressing any opinion upon what the charge for this work should be. That is up to the veterinarian and the owner of the horses. I would urge upon veterinarians, however, if this project is to succeed in any large way under present circumstances, the veterinarian's charge must be modest. At a price of 40c per head, the price charged in Illinois, a veterinarian can make from $7.00 to $15.00 *cash* in half a day, and under present practice conditions in this state that is more than most veterinarians are making in cash. We have stressed to the farmers that this is a cash proposition. However a few veterinarians have arranged to give their regular clients the usual terms. This is just as they individually see fit to do it.

Some few veterinarians have been unwilling to take any part in cooperative arrangements, preferring to handle the matter entirely by themselves and making all arrangements for the time and place of treatment. There is no objection to this if they want to do it that way.

However, all should keep in mind that times are changing, in fact have already changed, and be prepared to do a little cooperating among themselves, with their clients and with the Extension Service if necessary. The period of "rugged (ragged) individualism" has fallen pretty hard and there are indications that it must give way to a period of cooperation. In fact, this has already occurred in some measure. It may be advantageous for veterinarians to keep an open mind on the subject and be prepared to accept and to take advantage of the inevitable if it comes.

*Notes from an address by B. J. Killham, Lansing, Michigan, at the Eleventh Annual Post-Graduate Short Course for Veterinarians, Michigan State College, East Lansing, January 22-26, 1934.

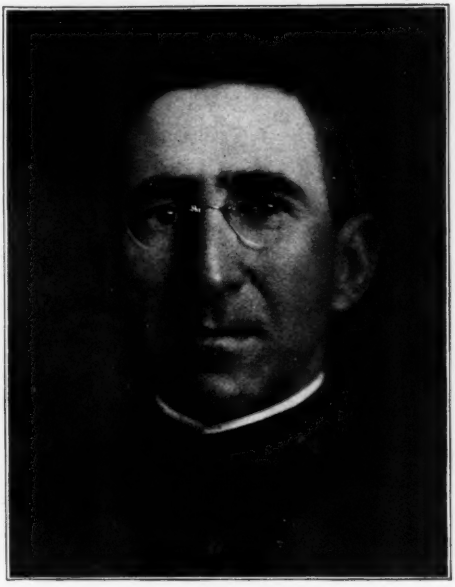
Foster Will Head Veterinary Corps

ON OR ABOUT May 1st, the Veterinary Subdivision of the Surgeon General's Office will receive a new director. Col. Robert J. Foster will arrive from Fort Bliss at that time to take over from Col. Walter Fraser direction of the Veterinary Service of the army. His appointment is for a period of four years.

Colonel Foster was born in Ithaca, New York, and was graduated from the New York State Veterinary College at Cornell University in 1902. For the next three years he was instructor in veterinary science or bacteriology successively at Clemson College, South Carolina, University of Missouri and the Kansas State College. In 1905 he accepted an appointment as army veterinarian and was assigned to the 12th Cavalry, then stationed at Fort Oglethorpe, Georgia. He served with this regiment at Fort William McKinley, Philippine Islands; Fort Robinson, Nebraska; Fort Meade, South Dakota, and along the Mexican border during the Villa troubles until January, 1916.

He was then transferred to duty with the 9th U. S. Cavalry at Camp Stotsenberg, Philippine Islands, where he served until the fall of 1917. Ordered back to the United States on account of the World War, he was shipwrecked off the coast of Formosa on board the U. A. A. T. Thomas, en route to the United States with the 8th Infantry aboard.

Upon arrival in the United States, he was ordered to organize and command the Veterinary Section of the Medical Officers Training Camp at Fort Riley, Kansas. In August, 1919, he was ordered to the War Department, Washington, D. C., for duty as officer in charge of organization and training for the Army Veterinary Corps in the Surgeon General's Office. In November, 1920, he was transferred to duty as Chief Veterinarian, Army of Occupation, Coblenz, Germany, and served there till June, 1922.



Col. Robt. J. Foster

Returning to the United States, he was assigned as Station Veterinarian and officer in charge of Veterinary Instruction at the Cavalry School, Fort Riley, Kansas, where he remained until July, 1926, when he was transferred to the Panama Canal Department with station at Corozal, Canal Zone, as Department Veterinarian until 1929. Col. Foster was next stationed at Omaha, Nebraska. In 1931 he was transferred to the First Cavalry Division, Fort Bliss, Texas.

In June, 1909, Colonel Foster married Alice Ewing Johnston, daughter of the late Colonel T. A. Johnston, president, Kemper Military School, Boonville, Missouri.

Colonel Foster is known to look upon food inspection in the army as being the most important function of the Veterinary Corps and the service holding out the most opportunities for advancement in the esteem of the military establishment and for permanence. It is expected he will stress the importance of this phase of the work of the Veterinary Corps during his term as director.

Book Review

The Practice of Veterinary Medicine. D. H. Udall, Professor of Veterinary Medicine and Superintendent of the Ambulatory Clinic, New York State Veterinary College at Cornell University, Ithaca, N. Y. 267 pages and 81 illustrations. Published by the author, Ithaca, N. Y., 1933. Cloth, $5.00.

This is a consise treatise on the internal diseases of our domestic herbivora and swine. The approach is distinctly clinical and the treatise appropriately titled "The *Practice* of Veterinary Medicine." While the various diseases are presented primarily from the viewpoint of the clinician, such academic considerations as etiology and pathology, upon which rational treatment often rests, are succinctly discussed. References are cited in a bibliography for those desiring additional sources of information.

The clinical approach, as contrasted to the pathological approach, is aptly illustrated by the author's discussion of digestive disturbances in ruminants; under the caption of "Acute Indigestion of Ruminants" are included such pathological conditions, discussed as distinct and separate diseases by some of our earlier writers, as "overloading of the fore-stomachs," "impaction of the rumen," "impaction of the omasum," "acute tympany," "atony of the fore-stomachs" and "dilation of the rumen." The grouping of all these conditions under one head simplifies matters, for it is doubtful that it is clinically possible to distinguish in diagnosis between impaction of the omasum and atony of the fore-stomachs, nor is it essential from the standpoint of therapeutics. It is noteworthy that so-called "bloat" in ruminants is not discussed as a disease *per se,* but as a manifestation of acute indigestion due to the ingestion of certain highly fermentable foods; the treatment of this common mainfestation of indigestion is amply discussed, however. In contrast to acute indigestion the author discusses at considerable length a "traumatic indigestion or gastritis," under which caption he includes traumatic peritonitis, pericarditis, hepatitis and splenitis; traumatic pericarditis is not discussed as a primary disease of the heart but as a secondary to traumatic gastritis, where it logically belongs.

The classification of indigestions in ruminants is only typical of the author's slant in general; his presentation of intestinal disorders in the horse accompanied by symptoms of abdominal pain (colic) is similar, i. e. grouped into a very few subheads that can be more or less distinctly differentiated clinically.

Not only is the grouping of these various disturbances clinically logical but the methods of diagnosis and treatment are gone into in detail with minute specific recommendations where surgical and medicinal treatment is indicated.

Amongst the infectious diseases the following are classically discussed: diseases of the new born (calf scours, pneumonia, naval ill, paratyphoid, etc.), Bang's disease and mastitis. The value of the discussions of these diseases lies chiefly in the specific and extensive recommendations for control; no practitioner can get more information from any source on the handling of these diseases than is offered here.

Under diseases of metabolism the discussions of milk fever acetonemia, railroad disease and grass tetany are of special interest to the clinician; the discussion of rickets and osteomalacia are especially interesting in these days of vitamine and mineral food exploitation to the laity.

The volume is not "just another book" in the sense that it is simply a compilation of the work of others; while the work of others has of necessity been freely drawn upon, the wealth of personal experience gained by the author through contact with disease under conditions favorable to scientific evaluation (so often not available to or not availed of by the clinician) is generously incorporated into the text and adds to its value. Brevity, not at the expense of essentials, specific recommendations in treatment, both medical and surgical, and a distinctly clinical approach make the volume especially

valuable to the busy practitioner. It is indeed a *"practice"* of veterinary medicine.—H. Lothe.

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Beating Winter, by J. F. DeVine. Octave of 336 pages, 66 illustrations and seven maps. Published by Goshen Democrat Printing Company, Goshen, New York. Cloth, $2.65.

Most of the wide circle of friends of this popular veterinarian and veterinary writer will be surprised to learn of this effort far afield from articles on veterinary practice; but the task has been accomplished with the thoroughness the author's scientific training has given him and the enthusiasm characteristic of his perpetual youth.

Into a description of a tour of the Madeira Islands, the Islands of the Mediterranean, Northern Africa, Southern Europe and Asia Minor, he has interwoven a surprising amount of geography, history, mythology, sociology and philosophy. DeVine has made many trips into far away places, he enjoys them and makes the reader enjoy this one from the Punic Wars through the Crusades and the exploits of Columbus and Bruce to Allenby's Campaign in Arabia. Although history of the countries ancient and modern interests him and commerce and industry through the ages, it is the peoples and their customs that intrigue the author most and in the portrayal of which he soars highest. It is a book to read on a winter evening, or rather on several of them, and if you read it, you will want to see the scenes described at first hand and if you do, this foreknowledge will increase the joy of the trip.

* * * *

The Chow Chow, by Will Judy, Editor of *Dog World Magazine.* Illustrations by Bert Hanor. Octave of 185 pages, profusely illustrated. Published by Judy Publishing Company, Chicago. Cloth, $2.00.

Veterinarians will be favorably inclined toward this work at the start, because it is dedicated to one of the best liked of their number—John Jaffray of Chicago. "Friend and associate, a lover of dogs, a sportsman with the noblest creed, and a distinguished member of the veterinary profession, taking up the work of his father and dedicating his life to the better care of dogs and all other animals, and more particularly to creating an appreciation on the part of dog owners of their obligations to their dogs."

This work includes general information, entertainment and reference material features. The "Origin and History of the Chow" combines both entertainment and general information in a happy manner, except that the development of the chow in England is overdone and therefore somewhat tedious. We are told that the chow chow is not only a Chinese, but an arctic dog. That to the Chinese he was, and still is, of the highest utility, being a sledge dog, a hunting dog, a herd dog, a watch dog and an important food animal. The Chinese name of the dog, we are told, is chow kow, "chow" meaning eatable and "kow" dog. In the heavy coat the author sees protection from arctic blasts; in the up, then forward movement of the forelegs and the straight hind legs a heritage from countless ancestors of snow waders; in the powerful quarters the capacity for draft and in his morose unsociability a survival of centuries in a hard land where only the fittest for the struggle escaped starvation. The glory of the chow is his matchless coat and his leonine head.

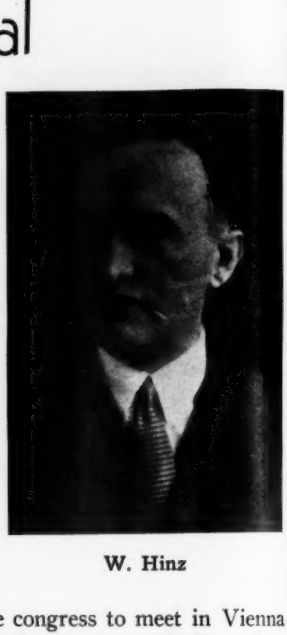
The official standard of the breed and its interpretation is given, a list of champions and some discussion of blood lines together with a discussion of breeding, whelping, feeding, training and kennel management.

There is a short chapter on General Health and Disease Principles which the author acknowledges may be a disappointment to some readers since he advises that the sick dog be taken early to a veterinarian. Prophylactic distemper treatment and antirabies vaccines are recommended for all dogs. A sop to the galleries is the statement that although rabies does occur in dogs it is a "very, very rare disease."

The work is a suitable one for the veterinarians' waiting-room table and will please chow fans immensely.

The 12th International Veterinary Congress

Professor Doctor W. Hinz, Director of the Pharmacological Institute of the Berlin Veterinary High School (Clinic for Small Domestic Animals), was born in Berlin in 1887; graduated from the institution in which he is now a professor in 1912 and the following year received the degree of Dr. Med. Vet. from the same institution. He served for ten years as chief assistant and associate professor and in 1923 was made Professor and Director of the Pharmacological Institute of the Berlin Veterinary High School. Professor Hinz is editor of the Tierärztliche Rundschau, a leading German weekly veterinary magazine, and a prolific writer, who has enriched German veterinary literature by a large number of articles, usually on subjects having to do with the diseases of small animals. Readers will recall a splendid article by him on Gastroscopy and Esophagoscopy in Dog Practice, published in the June 1932 issue of VETERINARY MEDICINE. It is expected that he will attend the 12th International Veterinary Congress in New York next August.



W. Hinz

THE most important veterinary meeting that will have been held in North America up until its assembly, will be the 12th International Veterinary Congress which will convene in New York City next August. We have already (February issue) given some description of the genesis of this organization which held its first meeting in Hamburg, Germany, July 14-18, 1863, on the call of Prof. Gamgee of Edinburgh, Scotland. The deliberations of the first congress had mainly to do with rinderpest, although rabies, anthrax, glanders, foot-and-mouth disease, pox, influenza, pleuro-pneumonia and scabies received consideration.

THE Second International Veterinary Congress (officially the Second International Congress of Veterinary Surgeons) convened in Vienna, August 21-28, 1865, pursuant to adjournment of the first congress. Prof. Dr. M. F. Röll, Director of the Imperial Veterinary Institute of Vienna, by whom the burden of arrangements for the congress had been chiefly discharged, was unanimously elected president of the congress.

The Emperor of Austria had granted permission for the congress to meet in Vienna and authorized the payment of all preliminary expenses, printing and mailing announcements, invitations and programs, and the cost of a stenographic report of the deliberations, out of public funds. Official invitations had been sent to all governments in Europe and 171 official delegates and others from nearly every state of Europe attended. The Imperial Academy of Science (university) provided a meeting place. As in the case of the first congress, no veterinarians attended from America. The congress was opened by an address of a representative of the Ministry of State followed by an address by a representative of the Ministry of Commerce, who said in part:

We promise ourselves from the deliberations, which so many learned and practically experienced gentlemen are about to commence, the most favorable results. They concern a most important part of national economy, which is continually opposed in its development and progress by a creeping serpent—namely, the devastating epidemic diseases. It needs only be remembered, that in the Austrian empire, the capital invested in cattle is more than 1,000 millions of florins, and that deplorable consequences are produced, on account of this important national economic capital being prevented from increasing, and even reduced from

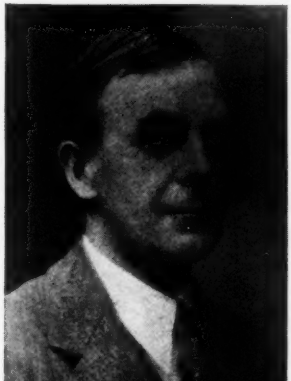
its normal amount, by these devastating diseases, which appear now in one place, now in another. Therefore, gentlemen, do we expect from your counsel and assistance, an important support for the future, a stay on which we may depend, and from which we may strive towards a better and higher aim.

AS IN the first congress, rinderpest received more consideration than any other disease, but at this congress rabies run it a close second. Bovine tuberculosis also received attention. The report of the discussion on rabies is particularly interesting, informative and even amusing. Many of the speeches were just what we would hear now if the control of this disease were under discussion at a meeting of the U. S. Live Stock Sanitary Association or the A. V. M. A. It illustrates how little real progress we in America have made in handling this disease during the past three-quarters of a century.

The Third International Veterinary Congress convened in Zurich, Switzerland in 1867; rinderpest still holding the leading position in the discussions. At this congress, veterinary education came up for discussion for the first time and the plans discussed for state veterinary regulation and service (live stock sanitary service) took more definite form than previously. The meeting of the Fourth Congress was set for Brussels, Belgium, four years later, but the outbreak of the Franco-Prussian War in 1871 occasioned its postponement till September, 1883. Thus a period of 16 years elapsed between the Third and Fourth Congresses, the same period that elapsed between the Tenth (1914) and the Eleventh (1930) Congresses. This second long lapse, of course, was due to the World War.

John Russell Greig, Ph.D., M.R.C.V.S., F.R.S.E., was born in Edinburgh, Scotland, 1889; graduated from the Royal (Dick) Veterinary College, Edinburgh, 1911. He served in the Veterinary Department of the City of Glasgow and on the Veterinary Staff, Ministry of Agriculture, and with the British Expeditionary Force in France (Captain, late R.A.V.C.). In 1919 he was appointed Professor of Medicine and Materia Medica, Royal (Dick) Veterinary College, thus succeeding to the chair once held by the famous Walley. Director, Moredun Institute, Animal Diseases Research Association since 1930 and Honorary Research Professor in Animal Pathology, Royal (Dick) Veterinary College.

Professor Grieg's principal researches include the determination of the causation and nature of milk fever (with Professor Henry Dryerre) for which he received the degree of Doctor of Philosophy, University of Edinburgh. The Nature of Lambing Sickness. The nature of louping-ill (jointly with Research Associates). He devised the method of subcutaneous calcium therapy for the treatment and prevention of milk fever. He edited the fourth and fifth editions of Hoare's Veterinary Materia Medica and Therapeutics.



J. Russel Greig

Professor Russel Grieg's career is perhaps unique in that it covers a wide practical experience in General Practice; Public Health Work; State Medicine; Military Veterinary Service; Teaching; Research and Authorship. His association with the Royal (Dick) Veterinary College has been long and intimate and he is steeped in the traditions of that institution, which furnished to America, Andrew Smith, Duncan McEachran, James Law, C. P. Lyman and L. McLean, founders of veterinary education in North America and of our Federal veterinary service, the same institution from whence came Thomas Walley, Thomas Strangeways, William Williams, James McCall, William Robertson, Sir Stewart Stockman, Sir John McFadean and a host of others whose names are written large in the record of veterinary progress.

Readers will recall a scholarly article from the pen of Prof. Greig, The Nature of Milk Fever, in the February 1931 issue of VETERINARY MEDICINE. His hobby is veterinary history and the history of old Edinburgh. He has given assurances that he will attend the 12th International Veterinary Congress in New York City next August.

Development of Veterinary Medicine in North America

By D. M. CAMPBELL

II—THE FIRST PERIOD—1790 to 1850

He who studies the conduct of his ancestors will not require the prophesyings of a seer to read the history of his descendants.—Chinese Proverb.

2. THE FOUNDATION

THE first veterinary work published in America of which the writer has found any trace is a reprint of a Scotch work by James Clark of Edinburgh and was published in 1791 in Philadelphia, then the largest city in the United States and the center of learning and culture—a city of 45,000 population. This work appears to have been an authorized publication and not pirated, as was the custom at the time and long since. Nothing is known of William Spotswood, the publisher; he was probably a disciple of Franklin, not a veterinarian, but must have known and perhaps been encouraged by some skilled men in veterinary practice, for the book is plainly stated to be for qualified veterinary surgeons, not for ignorant quacks or for horse owners, as was every other veterinary work published in this country for the next seventy-five years. Spotswood would scarcely have set out upon a venture of this kind without knowing of a market where his book could be sold.

The first edition of Clark's "Preventive Veterinary Medicine" was published in Edinburgh in 1788. The edition under consideration was published in Edinburgh in 1790 and in Philadelphia the following year.

It is a matter of gratification that this, the first truly veterinary work published in America, should be a thoroughly scientific one, representing the best veterinary knowledge and practice in the British Isles, in fact in Europe, at the time.

It is important to examine this volume in detail. It constitutes the foundation on which later veterinary development in this country was builded, in the sense that published in America, at the very dawn of veterinary progress or earlier, it places definitely on record the information that was then available to those interesting themselves in the diseases of live stock. What others did and what they failed to do must be judged upon the basis of Clark's teachings, which were available to them from 1791 onward. The foundation of veterinary science having been laid by this work, later works must be measured by this standard, mentioning only what information they added to that supplied by Clark and by what they failed of reaching his level. The title page of this work reads:

Treatise on the Prevention of Diseases Incidental to Horses, from bad management in regard to stables, food, water, air and exercise, to which are subjoined observations on some of the Surgical and Medical Branches of Farriery. By James Clark, farrier to his Britannic Majestry, Honorary and Corresponding Member of the Society of Agriculture, at Odiam in Hampshire. From the second Edinburgh edition, corrected and enlarged. Published and printed by William Spotswood, Philadelphia, 1791.

Little is known of the life of James Clark, other than what can be deduced from his works, of which there were three—"Shoeing" in 1770, the one under consideration in 1788 and "Veterinary Physiology and Pathology" in 1806. Neither the first nor the third were republished in America. There were several editions of both the first and the second works.

The date of Clark's birth is unknown. General Smith thinks he must have died about 1807. He left an unpublished manuscript which has been lost.

As revealed by his works, no better de-

scription of James Clark can be written than that by General Smith[4] from which the following is taken:

We have now reached the great figure of the eighteenth century. Had all the previous writers been first-class men, James Clark of Edinburgh, "Farrier" to the King for Scotland, and later "Veterinary Professor," would still have been the giant of the period. Unfortunately, nothing is known of his history, not even the date of his birth and death. He was a practitioner of Edinburgh, where, I suppose, from the evidence contained in his works, he lived all his life, though he visited London and observed the practice in the south and the class of disease most frequently met with. He must have received a good education, for he writes gracefully; not only is his language well selected, but he possessed the power of expressing logically, clearly and mildly what he knew; he is free from all exaggeration, and never employs his pages as a means of advertisements; no remark of disparagement of others ever occurs, a feature very uncommon in his day, not only in veterinary but other branches of literature. Where he differs from another writer, he does so as a gentleman and not as a savage. We picture him as a mild man of philosophical disposition, whose life had been spent in thinking out the numerous problems which the practice of his profession suggested, earnestly bent on leaving it wiser than he found it, and ever jealous of its good reputation. He was the first Veterinarian in Britain to strike out a new line. . . . For the first time we meet with a man who had the courage to grapple with the hideous practices of his day, to reject nearly the whole of the old dogma, and open new paths in the theory and practice of his art. Clark was a wide reader. Columella and Vegetius had been consulted, also the works of Lafosse, Bracken, Osmer, Buffon, Berenger, Pembroke, Lord Kaimes (on Agriculture), Hales, and especially Van Sweiten's Commentaries on the Aphorisms of Boerhaave. . . . We are accordingly prepared to learn that Clark exhibited a medical philosophy which hitherto had been absent in veterinary writers and practitioners; he was also a student of physiology and hygiene, but he does not wax warm over surgery.

. . . . . .

He must have been a strong personality to have so completely and successfully defied the practice of his time. He sweeps away with infinite disgust the old-fashioned method of referring to the recipe book for "the cure," and says that the practitioner "must first investigate the cause, the nature, and various symptoms attending different diseases that have a resemblance to one another . . . and when he has carefully compared them together he will be able to make a proper distinction and in a great measure to determine the true seat of the disease." Elsewhere he says that he will not waste time in refuting "the ridiculous encomiums bestowed on the variety of recipes that are handed down with a *probatum est* as attestation of their particular virtues . . . many of the compositions are a confused jumble of ingredients calculated more for the apothecaries' profit than benefit to the patient." In speaking of "humours" he tells us that "the vulgar opinion of humours falling down into this or that particular part of the body . . . is exceedingly erroneous; . . . humours are said to fall down when a horse's eyes are affected, although they are situated nearly in the most elevated part of the body." He is opposed to indiscriminate bleeding and the administration of drugs to healthy animals. Clark, in fact, attacks in the most uncompromising manner the basis of medical and veterinary practice of his day.

Throughout his work he is distinguished for his humanity to his patients; he inculcates kindness, and gentleness; his medical treatment is soothing, his surgical is never violent; blisters and the actual cautery rarely appear to have been employed; caustics are hardly referred to, and though he wrote a work on the diseases of the foot, he never even mentions that terrible operation, then so commonly performed, of "drawing the sole." His pharmacy is clean, almost elegant; he is opposed to the employment of nauseating drugs, and says that drenches should be made as far as possible attractive, and sweetened to render them less repulsive to the patient. He devotes a special chapter to the nursing of the sick, a subject rarely mentioned by any previous writer.

Clark is the father of veterinary hygiene. He regarded bad hygiene as the chief cause of disease. If a disease, as for example if glanders or influenza swept through a barn, affecting all or most of the animals in it, Clark regarded bad management as being the predisposing cause of the disease and that the animals, all being subjected to the same unhygienic environment, lack of feed, or abuse, reacted in a uniform manner. He was much ahead of his time and evidently expected some of his teachings to be received with skepticism. In the introduction to this volume, he says:

It is to be regretted with what obstinacy many ridiculous absurdities are persevered in, relating to horses, in opposition to experience, and to common sense, which nothing can ever banish from stables, but the interposition of those whose real interest it will be, and who should assume the right they have to think for themselves, without being dictated to by those they should command.

While deploring the hovels in which the animals of the poor were stabled, he criticizes even more the stables of the wealthy, for he tells us also in the introduction:

A mode of refinement, if it may be so called,

[4]Smith, Major General Sir Frederick; The Early History of Veterinary Literature and its British Development. Volume II; published by Bailliere, Tindall & Cox, London, 1924.

prevails in the stables where fine horses are kept, every thing respecting the management of them is carried almost to an extreme, insomuch that there is hardly any medium observed. Thus, a certain degree of warmth is agreeable, and even necessary, to horses, yet they generally are kept too hot, at the same time frequently loaded with body-cloths. Food, which ought to be distributed according to their work or exercise, is frequently dealt with too liberal a hand; whether they work or not, the food is always continued the same, without considering whether the waste in the constitution requires a greater or a lesser supply of nourishment. Exercise, that necessary article for preserving them in health, and fitting them for the active exercises required, is too frequently neglected. Fresh air, that exhilarating principle of life, which is so essentially necessary for the health of all animals, is but too much excluded from their stables.

This, be it remembered, was written at a time when fresh air was almost universally regarded as pernicious for man and beast. Sixty years later Dadd found as much to criticize in stables of Boston and New York. Of the poorer class of stables, he says:

Many of the hovels at present used as stables, do not even deserve the name; and it is surprising that, considering the value and usefulness of horses, so little attention is paid to their health in this respect.

He tells us that it is the custom to build stables without windows and to stop up every crack that might admit fresh air and to stand the horses even in midsummer, 30 or 40 of them together, in pitch darkness on rotting manure which generated a great amount of heat.

There is little reason to suppose that the stables in America at the time were superior to those of Scotland, or that the standard of horse management was better. Clark makes but infrequent reference to infection as the cause of disease, but he in some measure suspected it, nearly a century before Pasteur and Koch, as revealed by the following:

Large crowded stables contribute greatly to communicate contagious or infectious diseases. A great number of horses breathing in one place contaminates the air; and, if it has not a free current, it soon becomes unwholesome, and, like the air of jails, it contracts a malignant quality, which produces fevers in those horses who stand in them; and, on changing them to other stables, they likewise communicate the infection to others. Hence it has been remarked in those epidemical diseases amongst horses which have appeared in Britain, that it raged with most violence in those stables where a great number of horses were confined together in one large stable, whilst its effects in small, well aired stables was more mild and less destructive.

He did not hesitate to attack boldly the most cherished superstitions in the management of horses, as for example in the following:

It is a common saying among stable people that horses feed best when kept in darkness. But this is by no means the case. They feed equally well in light, are fond of it, and show evident symptoms of pleasure when they are brought from a dark stable into the light, by their frisking, &c. Such stables are generally unwholesome; for, as they have no windows, fresh air is excluded as well as light.

He pointed out that the heat of the fermenting bedding and manure prevented the horses from lying down and resting properly, that the darkness of the stables in time injured their sight and caused them to shy when being driven and that constantly breathing the noxious atmosphere "may occasion fevers of the most malignant kind; and perhaps, this may be the cause of those epidemical fevers which break out in rainy seasons."

He points out that the Arabian horses, which are never stabled, possess fine quality and great endurance, and that the prevailing custom of keeping horses too warm in their stables and at the same time, in a hot, foul air cannot fail of being attended with bad consequences to their health. He says the stalls should be six feet wide in order that a horse may stretch his legs when he lies down. He regards the practice of "Girding horses' bodies so very tight above their clothing, by means of very broad girths (bandages) or rollers, having a considerable number of straps and buckles, with a view to taking up the horse's belly" as pernicious and futile, and points out that post horses when properly fed and regularly worked have as light bellies as the finest hunters or racers and yet no such thing as broad rollers are ever applied to them.

He mentions the custom in England, although it did not prevail in Scotland, of allowing hay to heat to a certain degree in the rick and thus acquire the smell of dry malt, stating that it gives the hay a sweetness to the taste and is called "mow-burnt." He states that animals overeat of such hay and because of the thirst it produces, drink great

quantities of water and because of the pressure on the diaphragm are in danger of becoming broken winded.

Of course, Clark knew nothing of vitamins, but he came very near to recognizing the need for them: "We know that sailors, and others who are confined for a length of time to live constantly on dry food, and that which is salted, are very subject to the scurvy. We likewise know what great advantages they reap from fresh greens and ripe fruits, in recovering from this loathsome disease." He states it is the same with horses and urges that they be given a variety of feed and a change of feed when the season permits.

He regards wheat as being a valuable food for horses but usually too high in price to justify its use. Barley he recommends only when it is mixed with cut straw to induce thorough mastication. He points out that oats contains a greater quantity of hull than other grains and should be fed in greater quantity than other grains on this account. He quotes Berringer to the effect that in the War in India when grain was scarce, horses were fed a mixture of rice and butter, and when they were compelled to go for a few days without feed they were given opium to damp their appetites and that on occasion Arabian horses subsisted on dates and camel's milk and that the ancients at times gave their horses wine to drink and animate and refresh them.

He lays much stress on the necessity for feeding the horse according to the way he is used and discourses at length on the evil which appears to have been common, of overfeeding horses that were idle. "Numbers of horses are daily ruined from this practice, yet many people are not aware of its effects." His whole article on feeding is an attack on the vogue of his day. He deserves great credit for his sound commonsense methods based upon physiology and his own extensive experience.

Less sound is his statement from Gibson (1751) that over feeding and over exercising not only cause obstruction to the bowels, but occasion a stoppage of the urine from too great a quantity of hardened dung lying in the rectum and pressing upon the neck of the bladder. He mentions one such case that was: "Seized with gripping pains and was treated in a very absurd manner, by giving him ardent spirits, aromatic powders and pepper." He states that this treatment is much too common in such cases and cannot be too severely condemned.

Clark's chapter on watering horses is as sound as theories on feeding. He regarded a pure water supply as of the greatest importance to the health of horses and that foul water not only led to deteriorated health from its injurious properties but was the cause of many disturbances because horses dislike it and will not drink a sufficient quantity.

He states that there are no cases on record in which large stones have been found in the urinary bladder of horses, but that he has observed such stones and thinks it might be possible that they may be due to drinking water containing a high mineral content.

He observes that horses "have stones in their kidneys as is very well known," and that the same is observed in the kidneys of sheep and oxen. He quotes Henry Bracken, M.D. (1757) in support of this view as to the cause of cystic calculi. He urges that water be offered to horses frequently, but not in too great quantities when they are heated from violent exercise, and states that the common practice of riding horses hard after they drink in order to warm the water in the horses' belly is extremely hurtful.

The discussion on exercise is extended and evidences good common sense in the main. For example, the following is given:

> . . . one great source of disease in horses arises from the improper treatment of them after they have been overheated by exercise or hard labour. This, one would naturally think, should occur to every man from his own feelings; but this is not the case; there are many stable people of such a particular way of thinking, that although a horse should be all over wet, and smoking with sweat, still they will insist, according to their own way of expressing themselves, that he is not heated at the heart, and expose him to the cold air uncovered, tied at the stable-door, and even allow him to drink his belly full of cold water in this heated condition. It would fill a volume to enumerate the many cases that have occurred where this treatment has proved fatal to horses.

(*To be continued*)

ONE WAY TO REDUCE TAXES

THE first definition of a "tax" is a "contribution levied on persons, property, or business for support of government." A second meaning of the word is a "strain or heavy demand" upon a person or a community. We hear a great deal today about the first kind of taxes. It might be wise to give some thought to the second.

From the standpoint of "strain or heavy demand" some of our most exacting tax collectors are the germs of the communcable diseases. In 1900 the bacillus of tuberculosis taxed the people of the United States to the tune of 195 lives for every hundred thousand persons in the population. That is this tax collector took the life of one person out of every 500 each year. In addition it collected the cost of medical and hospital care and the cost of supporting in partial or complete idleness at least one person out of every 150.

By 1930 the death rate from tuberculosis had fallen from 195 to 67 per 100,000. We had reduced the tax paid to this public enemy to one life out of every 1500 persons in the population with a similar reduction of two-thirds in the burden of sickness and disability. This is a sort of tax reduction which is well worth while.

How has this result been accomplished? By legislative machinery for the reporting of cases, by segregating or educating the consumptive so as to avoid infection of others, by eradication of bovine tuberculosis and pasteurization of milk, by public health nursing service to seek out contacts and early cases and bring them under medical care, by clinic service for early diagnosis, by sanatoria for treatment, and by systematic follow-up and supervision of the arrested case to hold the disease process under control. Simple, efficient, well-tried public health machinery has accomplished the task. Its efficacy has been fully tested during the past three years when the potential effects of the depression upon the death rate have been warded off except in certain relatively small sections of the population where deprivation has been greatest. It is neither chance nor some hypothetical biological change which has brought about results; for these results, in individual communities, have again and again been shown to vary in relation to the provision of community machinery for controlling the disease.

Recently, a new weapon has been placed in our hands. Experience has shown that many of the deaths which still occur from tuberculosis are due to previous partially controlled infection which suddenly lights up in a form too severe to be checked by our routine methods. The hope of preventing such catastrophes lies in the earlier detection of incipient infection—preferably in childhood, when the seeds of later trouble are generally sown. The new methods of taking x-ray pictures of large groups of school children at a minimum cost brings promise of a better defense against the tubercle bacillus than we have ever been able to set up before.

No matter how much the budget is cut, children must not suffer. This little boy is being protected against tuberculosis by having a tuberculin test.

The cost of a well-organized tuberculosis program (excluding the cost of sanatorium care which is largely treatment rather than prevention is less than 10 cents per year for each person in the general population. The results far outweigh this insignificant expenditure. We may illustrate by a single instance. The reduction in death rate from pulmonary tuberculosis in Syracuse, N. Y., for the decade 1922-1931 as compared with the decade 1912-1921 amounted to a saving of 115 lives a year. The total cost of the enlarged and almost ideal tuberculosis-control machinery of Syracuse was less than twelve thousand dollars. By paying one dollar in taxes to the city and the Community Chest, Syracuse saved paying one hundred dollars in taxes to the tubercle bacillus.

The question then is not whether we shall pay taxes or not, but how much we shall pay and for what. We can contribute a small sum to our health departments and clinics and nursing associations and tuberculosis associations for prevention; or we can pay a much larger sum as a tax on unprevented disease for the care of the sick, the support of the invalid, the burial of the dead, the loss of man power. We have reduced the tax levied by disease during the past thirty years to a fraction of what it once was. .We cannot afford to let our progress be nullified by the panic parsimony which is the enemy of true economy. We must rather go on with all the weapons at our command to the ultimate conquest of tuberculosis. "A few cents for defense, rather than millions for tribute," might well be our motto. The tax laid upon human vitality by preventable disease is one which we can abate if we have the courage to support in this crisis the official and the voluntary health agencies which have defended us so successfully in the past.

ARMY VETERINARY SERVICE

Each of the following-named officers of the Veterinary Corps is relieved from further assignment and duty at the station specified after his name, effective in time to comply with this order, will then proceed to Washington, D. C., and report to the commanding general, Army Medical Center, on or about August 28, 1934, for duty for the purpose of pursuing a course of instruction at the Army Veterinary School:

Lt. Col. Burton A. Seeley, Fort Benning, Ga.
Major Henry E. Hess, Fort Hamilton, N. Y.
Major Stanley C. Smock, Fort Hoyle, Md.

1st Lt. Harvie R. Ellis is relieved from his present assignment and duty at Fort Riley, Kans., effective at such time as will enable him to comply with this order, and will report on or about August 27, 1934, to the commandant the Cavalry School for duty as a student in the 1934-1935 regular course.

Veterinary Reserve Corps

Promotions:

Hiett, Allen Ambler to: 1st Lt. R. R. No. 11, Compton Rd., Mt. Healthy, Cincinnati, Ohio.

New acceptances:

Hyde, Roscoe, Capt., 402 W. Washington St., Hartford, City, Ind.

Rebrassier, Russel Edmund, Capt., 201 Piedmont Rd., Columbus, Ohio.

Aldrich, Percy Milton, 2nd Lt., R. F. D. No. 1, Dixie, Wash.

Fuller, Robert Clark, 2nd Lt., P. O. Box 68, Quitman, Ga.

Zacherly, Geo. Henry, Jr., 2nd Lt., 4905 Pulaski Ave., Philadelphia, Pa.

Annual Report of the Surgeon General

In the report of the Surgeon General of the Army for the fiscal year ending June 30, 1933, the number of officers in the Veterinary Corps is given as 120 and the vacancies as six. At the present time, the corps numbers 122 officers with four vacancies, which it is expected will be filled from eligibles who pass the examination to be held April, 1934. Only veterinary reserve officers are eligible to appointment. There were 951 enlisted men on duty with the Veterinary Corp throughout the year.

The medical and dental reserve corps increased in numbers during the year, for which the report is made; the former by 235 officers and the latter by 33. The veterinary reserve decreased by 26 officers during the year. The decrease in numbers in the veterinary reserve would have been greater and the increase in the medical and dental reserves would have been less or non-existent but for a liberalization of the policy of reappointment of medical department officers upon certification that their civilian occupation qualifies them for the duties that would be theirs upon mobilization. This is a doubtful policy at best, since it removes a powerful incentive to self improvement on the part of the reserve officer, retains uninterested and indifferent and to say the least, officers of doubtful qualifications.

It is by no means creditable to the veterinary profession or its organizations that in spite of this aid to the maintenance of numbers, it lost ground during the year. In the veterinary reserve, 53 new appointments were made during the year, 46 in the grade of second lieutenant and seven in the grade of captain.

In the veterinary R. O. T. C. units there were 81 students at Kansas State, 77 at Ohio State, 69 at Cornell and 17 at Iowa State College. Of these 132 were enroled in the basic course and 112 in the advanced course. Thirty-four completed their summer camp training.

The average strength of the army during the year was 125,408—11,693 officers and 113,715 enlisted men, exclusive of 6,517 Philippine scouts. The average animal strength was 31675, a decrease of 3,485 from 1931 and of 6,637 from 1932. The animal morbidity rate was 822 per thousand and the mortality rate 58.

There were 974 cases of thrush; 351 cases of influenza; 264 cases of ringworm; 89 cases of canker; and 35 cases of osteomalacia (all in Panama) and one case of surra handled by the veterinary corps during the year. There were 46,270 mallein tests administered, but no cases of glanders detected.

The number of dogs vaccinated during the year for the prevention of rabies was 4,474. No cases of rabies developed in vaccinated dogs, but 10 cases occurred among unvaccinated privately owned or stray dogs about military posts.

NEW CONSTRUCTION AT BELTSVILLE MAKES EXPERIMENT STATION A MODEL

Allocation of more than $1,750,000 of funds for new construction on Government property near Beltsville, Md., as a part of the public works program will enable the U. S. Department of Agriculture to take long strides in the development of a model experiment station for agriculture.

For moving the facilities of the Bureau of Animal Industry Experiment Station from Bethesda, Md., to Beltsville, $265,000 has been allowed. This fund will provide a number of small buildings required for the proper isolation and quarantine of many of the animals kept under test and observation in studies of disease. As building operations proceed there will be changes in the uses of some of the present structures, several of which are relatively modern and suitable for adaptation to the new plans. The laboratory used for the study of meat and also the recently completed beef-cattle barn are important structural units that fit in well with current building plans.

The field station of the Zoological Division of the Bureau of Animal Industry provides a place for so-called second-stage investigations of parasites. The first-stage studies are carried out at Washington, D. C., and include the identification of parasites and certain life-history studies which can be carried out under laboratory conditions. The second-stage work at

Modern Veterinary Practitioners

DR. CARL E. CHASE

Manchester, New Hampshire

B.S., Animal Husbandry, University of New Hampshire, D.V.M., Ohio State Univ., every citizen in Manchester knows about Dr. Chase and his work by virtue of a lengthy illustrated article concerning him in his local newspaper.

We were impressed by this quotation from the article: "Of course Manchester has other veterinarians," Dr. Chase says, "good ones, too." A typical statement of the modern veterinarian who boosts the profession by restraining professional jealousy.

Typical also is the endorsement by increasing numbers of modern veterinarians of the new Miller's Dog Foods, bio-tested and approved by Dr. J. W. Patton, D.V.M. Dr. Chase keeps a fresh supply of Miller's Foods for the convenience of dog owners living near his hospital.

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Beltsville includes studies of life histories under field conditions with reference to the effects of heat, cold, sunlight, moisture, plowing, and other factors that influence the survival of parasite eggs and larvae. The results of these studies lead to the development of control measures, first by small-scale tests and later on a more extensive scale.

To provide adequate facilities for animal-parasite studies the present plans call for a laboratory with rooms and facilities for insectaries, aquaria, and vivaria of various sorts for raising suitable hosts of worm parasites. There will be provision for temperature control for the study of factors that influence the survival of parasite material on pastures and in barns and stables. The farm will have many small pastures for intensive studies of the parasite populations of animals and pastures. The object of all this work is to develop methods by which stockmen may raise their animals as free as possible from parasites and the injurious effects they cause.

HADLEY'S QUESTIONS

If you have not yet sent in your answers to the 40 questions on wild animals, proposed by Doctor Hadley (page 83, February Veterinary Medicine), better do so now. The answers to these questions will be published next month.

Feeding a Dog

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